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LOANSTAR AFTER 11 YEARS: A REPORT ON THE SUCCESSES AND LESSONS LEARNED FROM THE LOANSTAR PROGRAM

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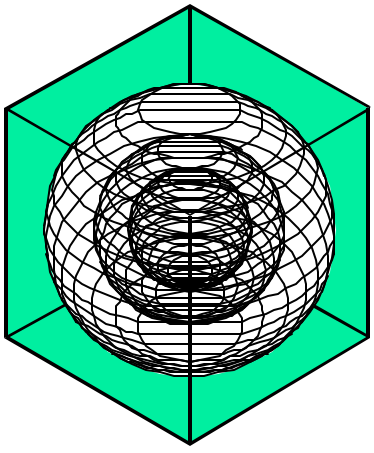
December 2002



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ABSTRACT

The Texas LoanSTAR program, which began in 1988, has produced over $119 million savings from energy conservation projects applied to state and local government buildings. One of the key features of LoanSTAR has been the monitoring and verification of the savings. Nationally, LoanSTAR has served as a showcase for other states to follow. LoanSTAR M&V methods have become the foundation for the USDOE's NEMVP, IPMVP and ASHRAE's Guideline 14P.

However, underneath the success of the LoanSTAR program are many lessons that have been learned that are not as highly publicized. This paper will present an overview of 11 years of measured savings from the LoanSTAR program, including the cost effectiveness of the LoanSTAR loans, trends in LoanSTAR funding, lessons learned about how to reduce the cost of a revolving loan program while maintaining quality control, and a discussion of the LoanSTAR emission reductions.

ACKNOWLEDGEMENTS

The Texas LoanSTAR program is supported by the Texas State Energy Conservation Office. Funding for the long-term analysis of LoanSTAR data was provided by SECO under a Technical Assistance grant. Special thanks to Ms. Theresa Sifuentes, Mr. Felix Lopez, and Mr. Dub Taylor at the Texas State Energy Conservation Office (SECO) who authorized the use of the LoanSTAR database for purposes of analyzing the cumulative program savings.

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INTRODUCTION

The Texas LoanSTAR (Loans to Save Taxes And Resources) Program was established in 1988 by the Texas Governor's Energy Office (GEO) as a revolving loan program for funding energy conserving retrofits in state and local government buildings. The program has been very successful. One of the important features of the LoanSTAR program is the Monitoring and Analysis Program developed by the Energy Systems Laboratory that measures and reports energy savings from the retrofits using hourly before-after measurements in sites where the cost of the retrofit exceeds $100,000. At such sites data acquisition systems are ideally installed six to twelve months prior to the retrofit to monitor energy consumption so that an hourly whole-building, before-after analysis can be used as the basis for calculating savings. Numerous papers have documented the successes and procedures developed in the LoanSTAR program, including Athar et al. (1998), Claridge et al. (1991, 1992, 1994, 1996), Kumar et al. (2002), Turner et al. (1992, 2000), and Verdict et al. (1990).

CUMULATED MEASURED SAVINGS

As of August 2002 the LoanSTAR program is measuring savings for 31 loan sites covering 298 buildings where retrofits have been fully or partially completed. The completed retrofits show $78 million[1] in measured[2] savings, which are broken down into

[1] The $78 million in metered savings include $3.5 million in savings which are also included in the Continuous Commissioning℠ savings shown in Figure 1.

[2] The phase "measured savings" is used here to denote where measurements are made during the baseline period, and during the post-retrofit period. A regression model of the baseline period is then developed and the parameters from the model are used to project the baseline energy use into the post-retrofit period. Measured savings are then calculated by comparing the post-retrofit energy use with the projected baseline energy use.

three components as shown in Figure 1: electricity savings of $43.4 million (53%), cooling savings of $24.6 million (30%), and heating savings of 14.4 million (17%). When combined with $28.8 million in Continuous Commissioning[SM] savings[3], $10.8 million in estimated savings from 98 sites using annual comparisons, for a total program savings of $118.5 million[4] as shown in Figure 2. It is interesting to note that these savings are 104% of the audit-estimated savings, which were estimated by the engineering consultants who designed the retrofits under contract to the Texas State Energy Conservation Office (SECO).

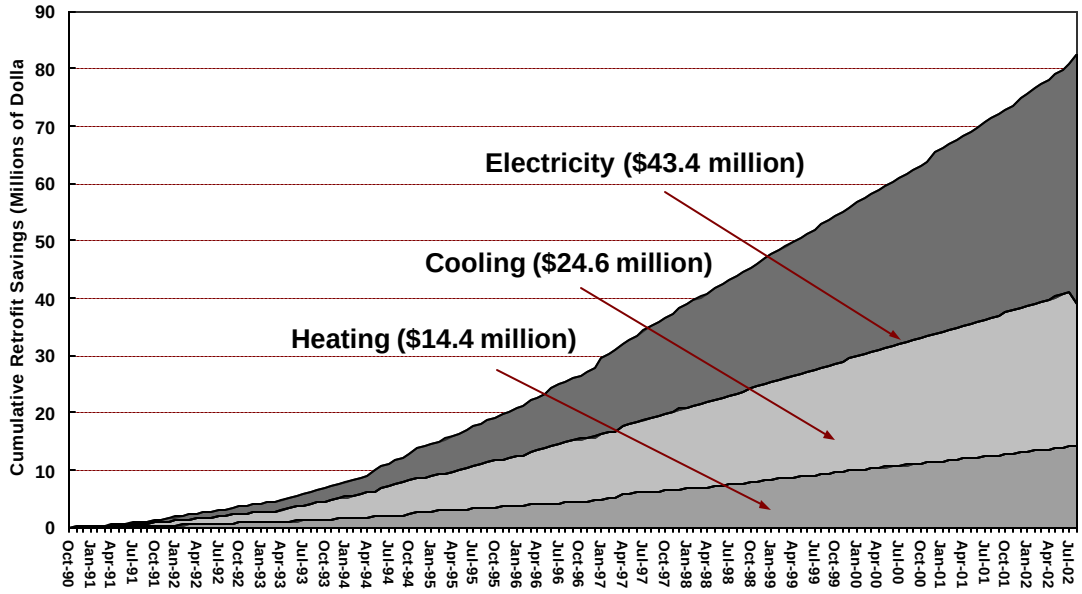

Figure 1. *Cumulative Metered LoanSTAR Retrofit Savings for the Period 1990 – 2002: $82,452,000 (includes CC savings overlap of $3,484,000 as of August 2002).*

[3] The term "Continuous Commissioning[SM] or CC[SM]" refers to the technology developed by the Energy Systems Laboratory whereby the Laboratory, working closely with the building operators, uses continuous energy use monitoring, to optimized the HVAC system's operation, reduce and then maintain its reduced energy use. The Laboratory is currently working closely with the Texas State Energy Conservation Office to help transfer this technology to the HVAC industry in Texas through a series of workshops. The Laboratory also works directly with Texas State Agencies to apply Continuous Commissioning[SM] to individual facilities.

[4] Savings include $3.5 million in savings overlap between retrofit savings and Continuous Commissioning[SM] savings.

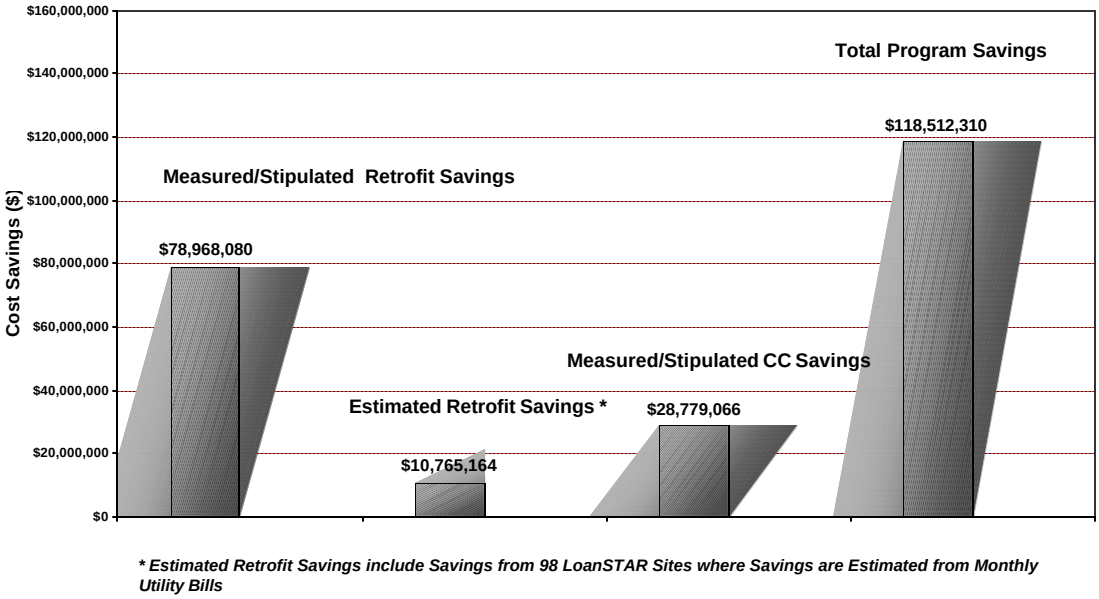

Figure 2. *Cumulative Total LoanSTAR Savings for the Period of 1990 – 2002: $118,512,000.*

The success of LoanSTAR's measured savings has been recognized by the USDOE and USEPA as a model program for its effectiveness and ground-breaking work. The data analysis methods developed in the program have also been adopted as the basis for the before-after (Option C) and the calibrated simulation procedures (Option D) in the North American Energy Measurement and Verification Protocols (NEMVP 1996), and the 1997 and 2000 International Performance Measurement and Verification Protocols (IPMVP 1997, 2001). LoanSTAR before-after analysis methods calibrated simulation methods are referenced in Guideline 14P under development by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE Guideline 14P 2002).

LESSONS LEARNED FROM THE LOANSTAR PROGRAM

Although the LoanSTAR program has been successful in its measurement of energy savings much can learned from the LoanSTAR program as is evident when one takes a closer

look at the details. For example, in Figure 3 the yearly savings from the LoanSTAR program are shown, including $28.8 in Continuous Commissioning℠ savings which began in 1993 and grew until 1997, when the effort was discontinued[5]. In the shaded portion of each year's value it is clear that the annual savings increased at a steady rate from 1990 to 1996, and then leveled-off in 1997 at about $10 million. Whereas, the total program savings increased by over $2 million in 1996, which is due in part to the Continuous Commissioning℠ effort. Unfortunately, this rapid rise in savings was soon halted by programmatic decisions. First, the Continuous Commissioning℠ effort was discontinued in 1997. Second, the payback period for the LoanSTAR program as extended from 4 years to 8 years in 1998 to allow more projects to qualify that could not meet the 4 year payback criteria. The impact of these two decisions can be clearly seen in Figure 4.

Figure 4 shows the total annual LoanSTAR retrofit expenditures and savings for the period 1991 to 2000 (Kumar et al. 2002). In 1991, the first year of recorded savings, the program had loaned $17,770,965. LoanSTAR reached a peak of $55,635,428 in loans in 1996, and decreased to an annual funding level of $27,281,071 in 2000. Since 1991 the measured and actual savings for the total program have closely tracked each other, beginning with an annual measured savings of $1,134,357, rising to a peak savings of $11,018,930 in 1997, decreasing to an annual savings of $794,678 in 1999, and rising back to $930,890 in 2000.

[5] During the period from 1993 to 1997 Continuous Commissioning℠ was funded as part of the LoanSTAR program. Since 1997 Continuous Commissioning℠ procedures have also been applied to the Texas A&M University campus, resulting in a savings of more than $3 million per year. LoanSTAR funding has also paid for Continuous Commissioning℠ at Texas Tech University, which has resulted in $250,000 in savings for the period 2000 - 2002.

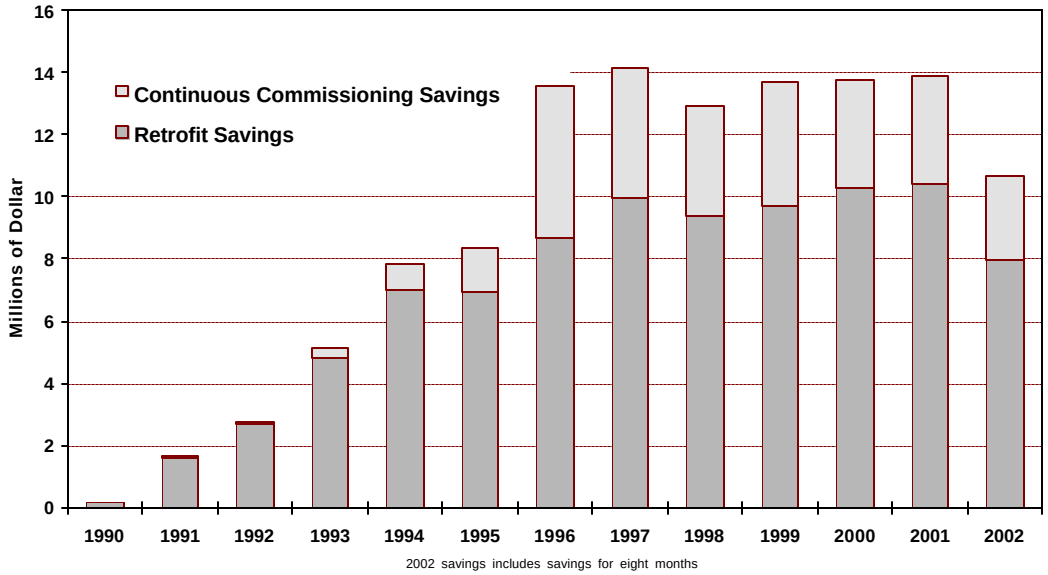

Figure 3. *Annual Savings from the LoanSTAR Program Including Continuous Commissioning^{SM} for the Period 1990 – 2002.*

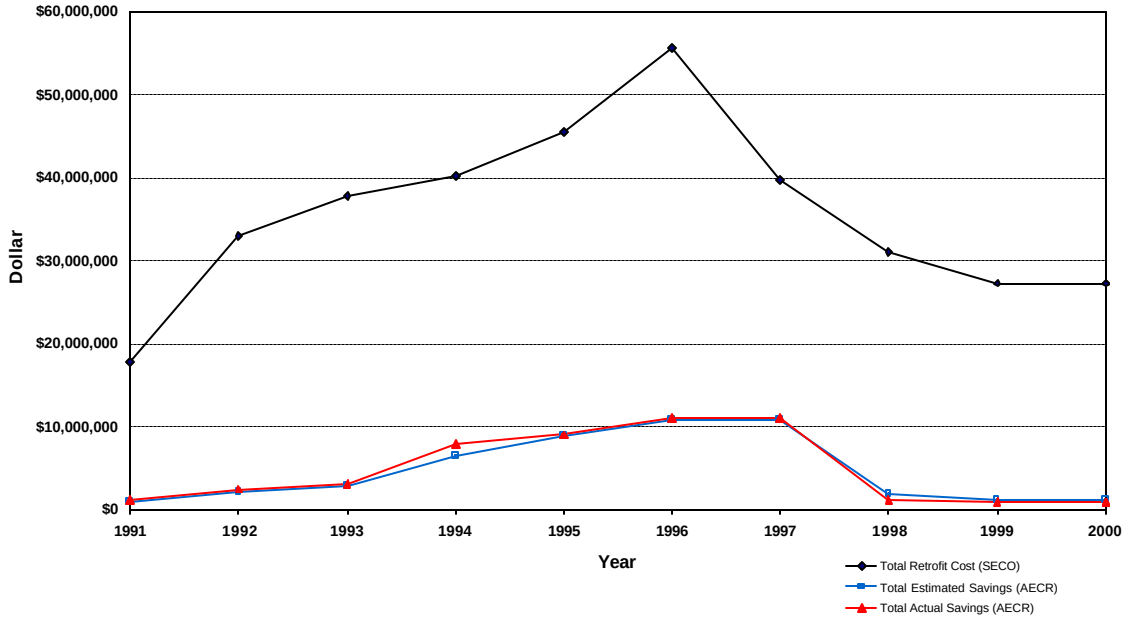

Figure 4. *Total annual LoanSTAR retrofit expenditures and savings: 1991 – 2000.*

In the LoanSTAR program the metering costs were initially fixed at 3% of the retrofit costs (through 1997), and became fixed at 3.5% of the retrofit costs in 1998, with about 1-2% per year for reporting and analysis. A review of the Annual Energy Consumption Reports (AECR) submitted to SECO reveals that several "trends" are observable when we compare the estimated vs. actual energy savings. First, is the fact that the estimated energy savings can over or under-predict the actual savings from 30% to almost 220% emphasizing the need for verification of energy savings, as shown in Figure 5.

Second, in Figure 5, which shows the multiyear realization rates for individual LoanSTAR buildings from 1991 to 2000, the realization rate is defined as the actual savings divided by estimated savings. The annual program average displayed as a solid line, which began at 114% in 1991, rose to a peak of 121% in 1994, dropped to a low of 63% in 1998 and rose back to 85% in 2000. This gradual decline in the realization rate also corresponds to a drop in the program return and annual LoanSTAR loan rate.

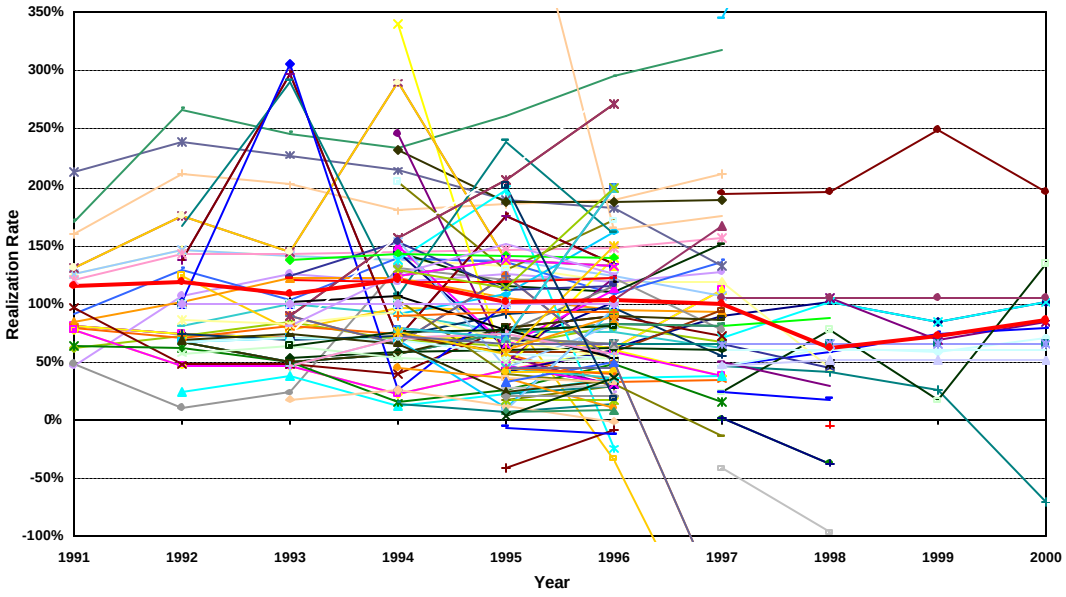

Figure 5. *Multi-year realization rate for LoanSTAR buildings (building data: 1991-2000).*

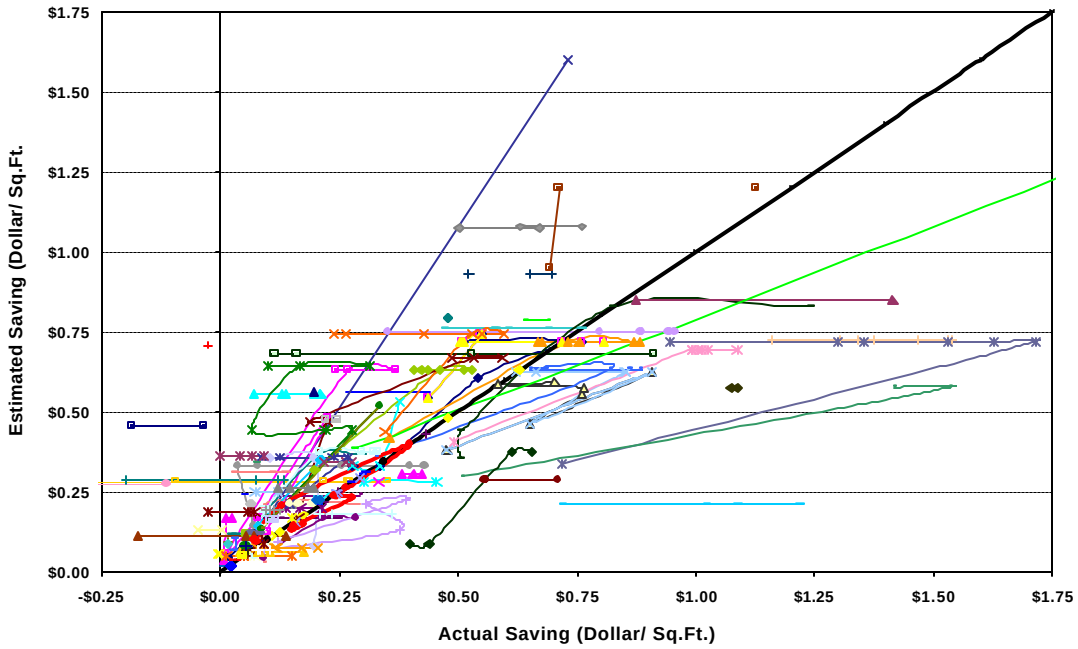

Figure 6. *Multi-year estimated savings vs. actual savings for LoanSTAR buildings (profiles: 1991 – 2000).*

Finally, in Figure 6, the actual savings (x-axis) are plotted against the estimated savings (y-axis) using a line to connect the points to show the behavior of the loan over time. This figure has helped to verify several features of interest. First, very few individual sites cluster around the diagonal line, which would represent complete agreement between estimated and actual savings. Sites that have a horizontal line represent sites where the estimated savings remained the same, but the actual savings varied over the life of the loan. This is in contrast to sites that have a vertical line, which represents sites where the actual savings remained the same, but information was discovered about the estimated savings that caused the value of the loan to change. Sites with varying diagonal lines contain a combination of changes to the actual and estimated savings. Several sites actually zig-zag back and forth indicating both positive and negative changes to either the estimated or actual savings – clearly a testament to the value of accurate measured savings.

These findings are consistent with other analysis that confirms the need for continuous monitoring of savings from energy conservation retrofits. Specifically, these analyses show that the sites with utility bill tracking only showed 70% savings whereas the sites with hourly measured data produced 100 – 110% savings and M&V with hourly data. A carefully administered commissioning program can produce 120 – 150% of audit retrofit saving reinforcing the results from earlier studies (Claridge et al. 1994; Claridge et al. 1996; Kats et al. 1996).

LOANSTAR EMISSIONS SAVINGS

Another benefit of the measured LoanSTAR savings has been the ability to calculate potential emissions savings from the energy conservation (Athar et al. 1998). As of August 2002, the total potential emissions reductions for the measured retrofit savings for the period 1990 to 2002 amounted to 4,411 tons NOx, 1.3 million tons CO_2, and 2,882 tons SO_2, as shown in Figure 7. Since the energy savings were primarily derived from hourly measurements, potential NOx emissions savings can be broken-down into heating (1,145 tons), cooling electric (650 tons), and other electric (2,616 tons) savings. National average emission factors from the Environmental Protection Agency's report (EPA 1992)[6] are used to translate savings in natural gas to environmental emissions reductions. Chilled water savings in MMBtu are converted into equivalent electricity savings in MWh; it is further translated into reduced emissions with other electricity savings by using emission factors from the EPA- Green Light Implementation Report Codes 6202J[7] (EPA 1992). The emissions

[6] National average emission factors reported by EPA in 1992 are: NOx: 0.53lbs/MMBtu, SO2: 0.00058 lbs/MMBtu, CO2: 117lbs/MMBtu.
[7] Texas average emission factors reported in EPA Report - Green Light Implementation Report Codes are: NOx: 5.50 lbs/MWh, SO2: 4.85 lbs/MWh, CO2: 1700 lbs/MWh.

reduction from the above three categories can help to indicate which energy conserving features are most likely to contribute to NOx reductions.

For example, although both heating and cooling have similar thermal energy reductions (i.e., 3.2 vs. 2.8 million MMBtu, respectively), it is interesting to note that energy conservation retrofits involving heating has significantly more NOx reductions than cooling. However, the majority of the heating NOx reductions occur in the winter when ozone formation from NOx does not rise above Environmental Protection Agency (EPA) limits. Therefore, calculating tons of NOx per day by dividing annual total NOx reductions (i.e., heating, cooling and electricity) would over-emphasize heating reductions and under-emphasize cooling reductions[8].

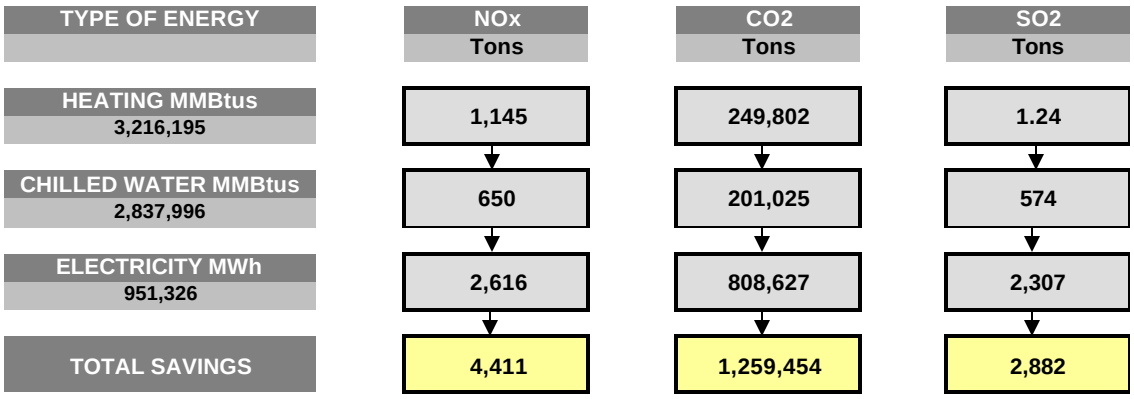

Figure 7. *LoanSTAR's potential for emissions savings: 1990 – 2002.*

[8] NOx emission reductions which are attributable to cooling-related savings occur primarily in the summer when ozone is problematic for several areas of Texas. Procedures for accurately calculating ozone reductions require hourly electricity savings data, as well as an hourly electric grid distribution model, hourly weather data, and the appropriate power generation dispatch models.

IMPACT OF CHANGING EMISSION FACTORS

There are a number of factors that influence the amount of emissions of a certain environmental pollutant as a result of burning a particular type of fuel. Not only do different types of fuels emit varying amounts of pollutants during the combustion process but the manner in which the fuel is burnt and the source of the fuel are also major factors in determining the amount of environmental emissions (Athar et al. 1998). Prior to the1990s, very little difference was observed for the annual emission factors published by the EPA for Texas. However, in the 1990s the power plant emissions factors began to change dramatically as utilities and industries were mandated by the Texas Legislature to lower their NOx emissions, in an effort to reduce excessive ozone levels in the Houston-Galveston and Dallas-Ft.Worth areas.

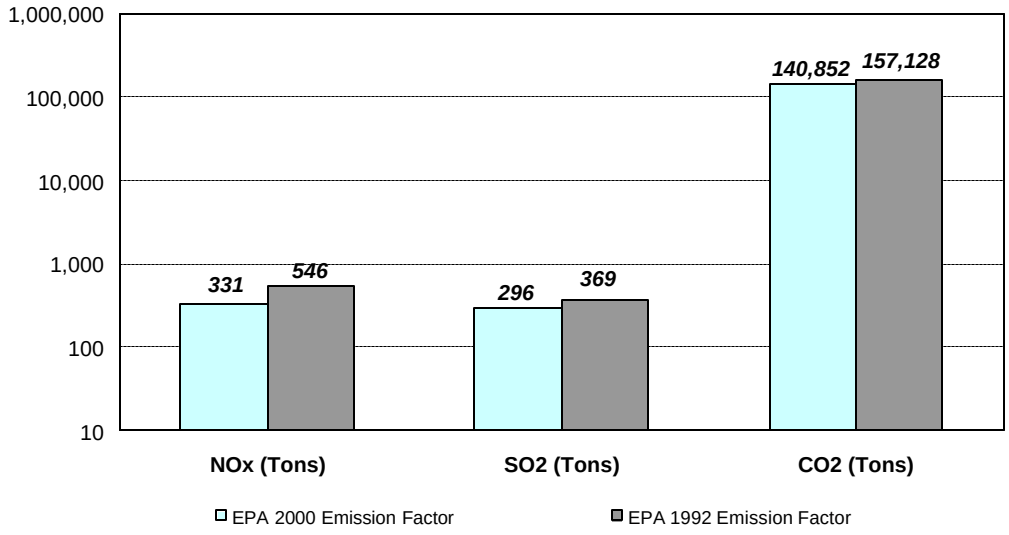

Figure 8. *Fluctuation 2001 LoanSTAR emissions rate.*

In Figure 8 the effect of the changing emissions factors is shown for the annual 2001 LoanSTAR emissions. In this figure the EPA's average, statewide emissions factors for

1992 are compared against the latest 2000 emissions factors. According to the EPA the utilities in Texas have successfully reduced their average, statewide NOx emissions to 61% of the early 1990 levels. At the same time SO_2 levels have been reduced to 80% of the previous levels. CO_2 have been reduced to 90% of previous levels. As these emissions levels continue to drop it is important to associate each year's energy savings with the appropriate emissions factors for the utility that supplied the electricity.

CONCLUSIONS

Currently, Texas has documented over $118 million in energy savings in hundreds of public buildings around the State of Texas. These energy savings have reduced the operating costs of these facilities and lowered the burden for taxpayers. LoanSTAR energy savings have also contributed substantially to a reduction in ozone-producing NOx emissions. Unfortunately, Measurement and Verification (M&V) on most of these buildings has been discontinued when the loans were paid back[9], which leaves an increasing likelihood that the actual cumulative savings may be less than the reported savings. Several studies by the Laboratory have shown that 20 to 30%+ of the savings will erode over time if these buildings are not carefully monitored[10], which would amount to a potential $2 to $3 million annual savings shortfall. Therefore, it is estimated that restarting the monitoring in these buildings and recommissioning the HVAC systems will likely produce substantial savings per year to the state, which will also have verifiable emissions reductions.

[9] When the M&V is discontinued for a given site, the weather-adjusted savings for the last year are stipulated in future years.
[10] Additional information about this can be found in the papers: Kumar, S., Haberl, J., Claridge, D., Turner, D., O'Neal, D., Sharp, T., Sifuentes, T., Lopez, F., Taylor, D., "Measurement and Verification Reality Check: A Yawning Gap Between Theory and Practice", Proceedings of the 2002 ACEEE Summery Study, (August); and Claridge, D., Liu, M., Deng, S., Turner, D., Haberl, J., Abbas, M., Bruner, H., Veteto, B., Lee, S. 2001. "Cutting Energy and Cooling Use Almost in Half Without Capital Expenditure in a Previously Retrofit Building", Proceedings of the Summer Study of the European Council for an Energy Efficient Economy (ECEEE), June 11-16, 2001, Mandeliu, Cote D'Azur, France.

REFERENCES

ASHRAE, 2000. "Proposed Guideline 14P – Measurement of Energy and Demand Savings," American Society of Heating, Refrigeration and Air Conditioning Engineers, Atlanta, GA.

Athar, A., Abbas, M., Haberl, J., Turner, D., Claridge, D. 1998. "Environmental Impact of The Texas LoanSTAR Program" *Proceedings of the Eleventh Symposium on Improving Building Systems in Hot and Humid Climates,* Ft. Worth, TX.:Texas Building Energy Institute.

Athar, A., Abbas, M., Haberl, J., Turner, D., Claridge, D., and Harvey, T. 1998. "Environmental Impact of the Texas LoanSTAR Program", *Proceedings of the Eleventh Symposium on Improving Building Systems in Hot and Humid Climates,* Texas Building Energy Institute, Ft. Worth, Texas, pp.113-222, (June).

Claridge, D., Haberl, J., O'Neal, D., Heffington, W., Turner, D., Tombari, C., Roberts, M., Jaeger, S. 1991. "Improving Energy Conservation Retrofits with Measured Results." *ASHRAE Journal*, Volume 33, Number 10, pp. 14 - 22, (October).

Claridge, D.E., Haberl, J.S., Sparks, R., Lopez, R., Kissock, K. 1992. "Monitored Commercial Building Energy Data: Reporting the Results." *ASHRAE Transactions-Research,* Volume 98, Part 1, pp. 636 - 652, (January).

Claridge, D., Haberl, J., Liu, M., Houcek, J., Athar, A. 1994. "Can you Achieve 150% of Predicted Retrofit Savings? Is it Time for Recommissioning?", *Proceedings of the 1994 ACEEE Summer Study on Energy Efficiency in Buildings*, pp. 5.73-5.88, (August).

Claridge, D., Haberl, J., Liu, M., Athar, A. 1996. "Implementation of Continuous Commissioning in the Texas LoanSTAR Program: Can you Achieve 150% of Estimated Retrofit Savings: Revisited", *Proceedings of the 1996 ACEEE Summery Study,* pp. 4.31-4.48, (August).

Emissions and Generation Resource Integrated Database 2000 (E-GRID 2000) Version 2.0. Released September 2001. Environmental Protection Agency (EPA).

Environmental Protection Agency (EPA) Report #AP-42. 1992. Compilation of Air pollutant Emission Factors. Table 1.4. pp. 1.4-5 - 1.4-6, (October).

Environmental Protection Agency (EPA) Report. 1992. Green Light Implementation Report Codes. Air and Radiation (6202J). Washington, DC 20460.

Kats, G., Rosenfeld, A., McIntosh, T., and McGaraghan, S. 1996. "Energy Efficiency as a Commodity: The Emergence of an Efficiency Secondary Market for Savings in Commercial Buildings," *Proceedings of 1996 Summer Study on Energy Efficiency in Buildings* "Profiting

from Energy Efficiency", Monterey, CA.: American Council for an Energy Efficient Economy (ACEEE).

Kissock, K., Reddy A., Haberl, J. and Claridge, D. 1993. "EModel: A New Tool for Analyzing Building Energy Use Data", *Proceedings of the IETC Conference*, pp. 237 – 244, (March).

Kumar, S., Haberl, J., Claridge, D., Turner, D., O'Neal, D., Sharp, T., Sifuentes, T., Lopez, F., Taylor, D. 2002. "Measurement and Verification Reality Check: A Yawning Gap Between Theory and Practice", *Proceedings of the 2002 ACEEE Summery Study*, accepted for publication, (August).

IPMVP 1997. *International Performance Measurement and Verification Protocol (IPMVP),* United States Department of Energy publication DOE/EE-0157, (December 1997).

IPMVP 2001. *International Performance Measurement and Verification Protocols (IPMVP),* United States Department of Energy publication DOE/GO-102001-1187, (January 2001).

NEMVP 1996 North American Measurement and Verification Protocol (NEMVP), United States Department of Energy publication DOE/EE-0081, (March 1996).

Turner, W.D., Haberl, J.S., Bryant, J., Finstad, C., Robinson, J. 1992. "Calibration Facility for the LoanSTAR Program," *Proceedings of the 1992 ASME/JSES/KSES Solar Energy Conference,* ASME, New York, N.Y., pp. 1269-1275, (April).

Turner, W.D., Claridge, D., O'Neal, D. Haberl, D., Heffington, W., Harvey, T. Sifuentes, T. 1998. "Program Overview: The Texas LoanSTAR Program; 1989 to August, 1997**",** *Proceedings of the Eleventh Symposium on Improving Building Systems in Hot and Humid Climates,* Texas Building Energy Institute, Ft. Worth, Texas, pp. 99-112, (June).

Turner, D., Claridge, D., O'Neal, D., Haberl, J., Heffington, W., Taylor, D., Sifuentes, T. 2000. "Program Overview: The Texas LoanSTAR Program: 1989 – 1999 A 10-year Experience", *Proceedings of the 2000 ACEEE Summery Study on Energy Efficiency in Buildings,* Volume 4, pp. 4.365 – 4.376, (August).

Verdict, M., Haberl, J., Claridge, D., O'Neal, D., Heffington, W., Turner, D. 1990. "The Texas LoanSTAR Monitoring and Analysis Program: Overview", *Proceedings of the 1990 ACEEE Summer Study on Energy Efficiency in Buildings,* pp. 7.261-7.271, (August).

APPENDIX

SPREADSHEETS DESCRIPTION FOR LOANSTAR PROGRAM FROM 1991-2002

The data of LoanSTAR Program from 1991- 2002[11] are arranged in electronic file, Excel spreadsheet format. The file, which consists of 23 spreadsheets and 32 charts, contains buildings and sites information, estimated savings and actual savings[12] as well as realization rates, payback periods, retrofit costs, metering costs, and approved loans amount. Examples of emission calculations for Nox, SO_2, and CO_2 are also available in AECR 2000 spreadsheet. A comparative chart of these emissions is presented in EMS00 spreadsheet.

The information of the data in the spreadsheets is mostly obtained from the Annual Energy Consumption Report (AECR). The Texas State Energy Conservation Office (SECO) provides retrofit and metering costs of each approved loans in this program. The State average emission factors of Texas from the Environmental Protection Agency's report (EPA 1992) and the emission factors from the EPA-Green Light Implementation Report Codes 6202J (EPA 1992) are used to calculate emissions reductions.

The structure of the spreadsheets is as follows:

THE LOANSTAR PROGRAM SPREADSHEETS FROM 1991-2002

Spreadsheet Name	Descriptions
DESCRIPT	- AECR Building Descriptions (1991-2002)
AECR91	- Annual Energy Consumption Report (1991)
AECR92	- Annual Energy Consumption Report (1992)
AECR93	- Annual Energy Consumption Report (1993)
AECR94	- Annual Energy Consumption Report (1994)
AECR95	- Annual Energy Consumption Report (1995)
AECR96	- Annual Energy Consumption Report (1996)
AECR97	- Annual Energy Consumption Report (1997)
AECR98	- Annual Energy Consumption Report (1998)
AECR99	- Annual Energy Consumption Report (1999)
AECR00	- Annual Energy Consumption Report (2000)
AECR01	- Annual Energy Consumption Report (2001)
AECR02	- Annual Energy Consumption Report (2002)
LOANS	- SECO Approved Loan Amount
EST	- AECR Estimated Savings (1991-2002)
ACT	- AECR Actual Savings (1991-2002)
MR	- AECR Multi-year Realization Rates (1991-2002)
EMS-PCA-TX	- E-GRID2000 (Texas)
Y-LOANS	- SECO Approved Loan Amount, By Year (1991-2002)

[11] There are only 8 months of data for the year 2002.
[12] Continuous Commissioning℠ savings are not included in the actual savings.

S-LOANS	- SECO Approved Loan Amount, By Site (1991-2002)
RET-EST-ACT	- AECR Annual Retrofit, Estimated Savings, and Actual Savings Cost (1991-2002)

Spreadsheet Name	**Descriptions**
S&B	- AECR Number of Sites & Buildings (1991-2002)
MR-PROF	- AECR Multi-year Realization Rate Profiles (1991-2002)
MR-2D	- AECR Multi-year Realization Rate, Two Dimensional Plot (1991-2002)
BLS-2D	- AECR Multi-year Realization Rate Buildings List (MR-2D)
MR-3D	- AECR Multi-year Realization Rate, Three Dimensional Plot (1991-2002)
BLS-3D	- AECR Multi-year Realization Rate Buildings List (MR-3D)
EST-VS-ACT	- AECR Audit Estimated Savings VS. Actual Savings (1991-2002)
BLS	- AECR Audit Estimated Savings VS. Act. Savings Buildings List (EST-VS-ACT)
R91	- AECR Realization Rate (1991)
R92	- AECR Realization Rate (1992)
R93	- AECR Realization Rate (1993)
R94	- AECR Realization Rate (1994)
R95	- AECR Realization Rate (1995)
R96	- AECR Realization Rate (1996)
R97	- AECR Realization Rate (1997)
R98	- AECR Realization Rate (1998)
R99	- AECR Realization Rate (1999)
R00	- AECR Realization Rate (2000)
R01	- AECR Realization Rate (2001)
R02	- AECR Realization Rate (2002)
P91	- AECR Simple Payback (1991)
P92	- AECR Simple Payback (1992)
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P99	- AECR Simple Payback (1999)
P00	- AECR Simple Payback (2000)
P01	- AECR Simple Payback (2001)
P02	- AECR Simple Payback (2002)
EMS00	- LSTAR Emission Reductions (2000)

Spreadsheet Contents

The followings are the information and data contained in the spreadsheets.

- DESCRIPT: *AECR Building Descriptions (1991-2002*)

  - Column A contains *Site Number* (listed consecutively as appearing in AECR)
  - Column B contains *Count Number*
  - Column C contains *Project Name*
  - Column D contains *Description* (Building Types)
  - Column E contains *Building Area* (sq. ft.)
  - Column F contains *Building Area Summary* (sq. ft.)
  - Column G contains *Number of Buildings*
  - Column H contains *Number of Buildings Summary*
  - Column I contains *SECO Retrofit Cost*
  - Column J contains *SECO Metering Cost*
  - Column K contains *SECO Retrofit Metering Cost Percentage*
  - Column L contains *Retrofit Year Completed*
  - Column M contains *Years of Data*
  - Column N contains *M&V Levels*

1991-2000 Building Descriptions

No.	Count No.	Project Name	Description	Building Area (sq. ft.)	Bldg. Area Summary (sq. ft.)	Number of Building	Number of Bldg. Summary	SECO Retrofit Cost	SECO Metering Cost	% Retrofit Metering Cost	Retrofit Year Completed	Years of Data	M&V Levels
1	CL006,CL080	Texas A&M University, College Station	Buildings		1,653,461		8	$4,590,573	$137,957	3.0%	1997	3 to 7	***
1.1	CL006	TAMU (1st Loan)	Building	324,400		1		$1,331,660	$39,950	3.0%	1991	7	***
1.1.1	CL006	Zachry Eng. Center	Building	324,400		1					1991	7	***
1.2	CL080	TAMU (2nd Loan)	Buildings	1,329,061		7		$3,266,913	$98,007	3.0%	1997	3 to 4	***
1.2.1	CL080	Evans Library (Old)	Building	312,289		1					1997	3	***
1.2.2	CL080	E. Langford Architecture Center	Building	102,105		1					1997	4	***
1.2.3	CL080	Old Architecture	Building	69,947		1					1997	4	***
1.2.4	CL080	Biological Sciences Building	Building	96,038		1					1997	4	***
1.2.5	CL080	Teague	Building	63,515		1					1997	4	***
1.2.6	CL080	Reed McDonald	Building	80,218		1					1997	4	***
1.2.7	CL080	Heldenfels Hall	Building	104,949		1					1997	4	***
2	CL001,CL040,CL081	University of Texas, Austin	Buildings		3,253,248		22	$10,352,296	$310,570	3.0%	N/A	2 to 7	***
2.1	CL001	UT, Austin (1st Loan)	Buildings	2,046,477		13		$4,678,852	$140,366	3.0%	1992	6 to 7	***
2.1.1	CL001	Education Building (Sutton)	Building	251,161		1					1991	6	***
2.1.2	CL001	University Teaching Center	Building	152,690		1					1990	7	***
2.1.3	CL001	P.C. Library	Building	483,395		1					1990	7	***
2.1.4	CL001	Garrison Building	Building	54,069		1					1991	7	***
2.1.5	CL001	Geology Building	Building	61,041		1					1991	6	***
2.1.6	CL001	Waggoner Hall	Building	57,598		1					1991	7	***
2.1.7	CL001	Welch Building	Building	439,540		1					1992	7	***
2.1.8	CL001	Burdine Building	Building	103,441		1					1991	7	***
2.1.9	CL001	Nursing Building	Building	99,815		1					1991	7	***
2.1.10	CL001	Whitis Building	Building	109,064		1					1991	7	***
2.1.11	CL001	R.A. Stranhan Building	Building	56,849		1					1991	7	***
2.1.12	CL001	Painter Building	Building	128,409		1					1991	7	***

Figure 1. *DESCRIPT: AECR Building Descriptions (1991-2002*)

- AECR91- AECR02: *Annual Energy Consumption (1991-2002)*

  - Column A contains *Site Number* (listed consecutively as appearing in AECR)
  - Column B contains *Count Number*
  - Column C contains *Project Name*
  - Column D contains *Description* (Building Types)
  - Column E contains *Building Area* (sq. ft.)
  - Column F contains *Building Area Summary* (sq. ft.)
  - Column G contains *Number of Buildings*
  - Column H contains *Number of Buildings Summary*
  - Column I contains *AECR Estimated Savings* (Dollars)
  - Column J contains *AECR Estimated Savings Summary* (Dollars)
  - Column K contains *AECR Actual Savings* (Dollars)
  - Column L contains *AECR Actual Savings Summary* (Dollars)
  - Column M contains *Realization Rate*
  - Column N contains *Realization Rate Summary*
  - Column O contains *SECO Retrofit Cost*
  - Column P contains *SECO Metering Cost*
  - Column Q contains *SECO Retrofit Metering Cost Percentage*
  - Column R contains *Estimated Simple Payback*
  - Column S contains *Actual Simple Payback*
  - Column T contains *AECR Estimated Savings* (Dollars/sq. ft.)
  - Column U contains *AECR Estimated Savings Summary* (Dollars/sq. ft.)
  - Column V contains *AECR Actual Savings* (Dollars/sq. ft.)
  - Column W contains *AECR Actual Savings Summary* (Dollars/sq. ft.)
  - Column X contains *Retrofit Year Completed*
  - Column Y contains *Years of Data*
  - Column Z contains *M&V Levels*

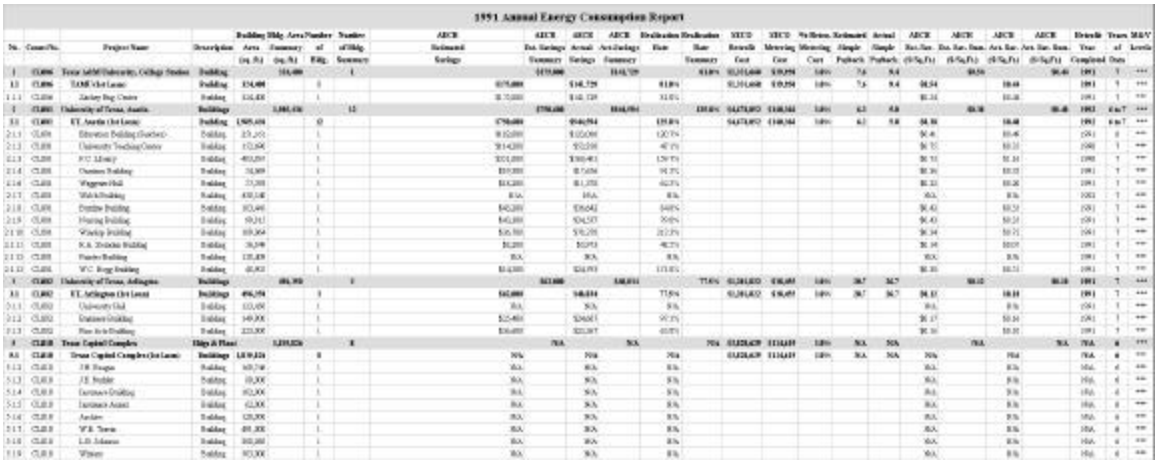
1991 Annual Energy Consumption Report

Figure 2. *AECR91: Annual Energy Consumption (1991)*

- LOANS: *SECO Approved Loan Amount*

  - Column A contains *Site Number* (listed consecutively as appearing in AECR)
  - Column B contains *Date approved*
  - Column C contains *Loan Number*
  - Column D contains *Count Number*
  - Column E contains *Category Site Names*
  - Column F-N contains *Approved Loans Amount in each Year* (1990-1998)
  - Column O contains *Total of Approved Loans Amount* (1990-1998)

Approved Loan Amount (SECO)

Site No.	Date Approved	Loan No.	Count No.	Category Site Name	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
11	Jan-95	95-22973-1-7114-0	C1038	Texas A&M University (1st Loan)	$1,331,680									$1,331,680
12	Jan-95	95-08031-2-038-0	C1038	Texas A&M University (2nd Loan)						$3,366,913				$3,366,913
21	Feb-90	9022973-1-721-0	C1001	U. T. Austin (1st Loan)	$4,671,352									$4,671,352
22	May-92	93-08028-1-721-0	C1048	U. T. Austin (2nd Loan)			$2,030,887							$2,030,887
23	Jan-95	95-08031-2-031-0	C1001	U. T. Austin (3rd Loan)						$3,652,557				$3,652,557
31	Feb-90	90-24157-1-714-0	C1032	U. T. Arlington (1st Loan)	$1,201,822									$1,201,822
32	Apr-92	93-08028-1-714-0	C1051	U. T. Arlington (2nd Loan)			$3,806,146							$3,806,146
4	Mar-98	00-00137-1-732-1	C1137	Texas A&M - Kingsville									$2,072,144	$2,072,144
51	Nov-90	91-24858-1-303-0	C1016	State Purchasing & General Services Com.	$3,838,629									$3,838,629
52	Feb-91	91-08001-1-808-0	C1046	State Preserv. Board (Cap. Extension)		$1,247,420								$1,247,420

Figure 3. *LOANS: SECO Approved Loan Amount*

- EST: *AECR Estimated Saving (1991-2002)*

  - Column A contains *Site Number* (listed consecutively as appearing in AECR)
  - Column B contains *Count Number*
  - Column C contains *Project Name*
  - Column D contains *Description* (Building Types)
  - Column E contains *Building Area* (sq. ft.)
  - Column F contains *Building Area Summary* (sq. ft.)
  - Column G contains *Number of Buildings*
  - Column H contains *Number of Buildings Summary*
  - Column I-R contains *AECR Estimated Savings, Dollars/sq. ft*. (1991-2002)
  - Column S contains *SECO Retrofit Cost*
  - Column T contains *SECO Metering Cost*
  - Column U contains *SECO Retrofit Metering Cost Percentage*
  - Column V contains *Retrofit Year Completed*
  - Column W contains *Years of Data*
  - Column X contains *M&V Levels*

-

Figure 4. *EST: AECR Estimated Savings (1991-2002)*

- ACT: *AECR Actual Saving (1991-2002)*

  - Column A contains *Site Number* (listed consecutively as appearing in AECR)
  - Column B contains *Count Number*
  - Column C contains *Project Name*
  - Column D contains *Description* (Building Types)
  - Column E contains *Building Area* (sq. ft.)
  - Column F contains *Building Area Summary* (sq. ft.)
  - Column G contains *Number of Buildings*
  - Column H contains *Number of Buildings Summary*
  - Column I-R contains *AECR Actual Savings, Dollars/sq. ft*. (1991-2002)
  - Column S contains *SECO Retrofit Cost*
  - Column T contains *SECO Metering Cost*
  - Column U contains *SECO Retrofit Metering Cost Percentage*
  - Column V contains *Retrofit Year Completed*
  - Column W contains *Years of Data*
  - Column X contains *M&V Levels*

Figure 5. *ACT: AECR Actual Savings (1991-2002)*

- MR: *AECR Multi-year Realization Rate (1991-2002)*

  - Column A contains *Site Number* (listed consecutively as appearing in AECR)
  - Column B contains *Count Number*
  - Column C contains *Project Name*
  - Column D contains *Description* (Building Types)

- Column E contains *Building Area* (sq. ft.)
- Column F contains *Building Area Summary* (sq. ft.)
- Column G contains *Number of Buildings*
- Column H contains *Number of Buildings Summary*
- Column I-R contains *AECR Realization Rate* (1991-2002)
- Column S contains *SECO Retrofit Cost*
- Column T contains *SECO Metering Cost*
- Column U contains *SECO Retrofit Metering Cost Percentage*
- Column V contains *Retrofit Year Completed*
- Column W contains *Years of Data*
- Column X contains *M&V Levels*
-

Figure 6. *MR: Multi-year Realization Rate (1991-2002)*

- EMS-PCA-TX: *E-GRID2000 Version 2.0 Power Control Area File (Texas)*

  - Column A contains *E-GRID2000 1998 file operator power control area sequence number* (SEQPCP98)
  - Column B contains *Power control area name* (PCANAME)
  - Column C contains *Power control area ID* (PCAID)
  - Column D contains *NERC region name* (NERC)
  - Column E contains *PCA average 1998 annual NOx output emission rate , lbs/MWh* (PCNOXRTA)
  - Column F contains *PCA average 1998 annual SO2 output emission rate, lbs/MWh* (PCSO2RTA)
  - Column G contains *PCA average 1998 annual CO2 output emission rate, lbs/MWh* (PCCO2RTA)
  - Column H contains *PCA gas 1998 annual NOx input emission rate, lbs/MMBtu* (PCGNOXR)
  - Column I contains *PCA gas 1998 annual SO2 input emission rate, lbs/MMBtu* (PCGSO2R)
  - Column J contains *PCA gas 1998 annual CO2 input emission rate, lbs/MMBtu* (PCGCO2R)

E-GRID2000 Version 2.0 Power Control Area [Operator Based] File -TEXAS

1998

E-GRID2000 1998 file operator power control area sequence number	Power control area name	Power control area ID	NERC region name	PCA average 1998 annual NOx output emission rate (lbs/MWh)	PCA average 1998 annual SO2 output emission rate (lbs/MWh)	PCA average 1998 annual CO2 output emission rate (lbs/MWh)	PCA gas 1998 annual NOx input emission rate (lbs/MMBtu)	PCA gas 1998 annual SO2 input emission rate (lbs/MMBtu)	PCA gas 1998 annual CO2 input emission rate (lbs/MMBtu)
SEQPCP98	PCANAME	PCAID	NERC	PCNOXRTA	PCSO2RTA	PCCO2RTA	PCGNOXR	PCGSO2R	PCGCO2R
1	American Electric Power - West (ERCOT)/PCA	3280.0	ERCOT	2.687	1.689	1474.895	0.208	0.001	117.900
2	American Electric Power - West (SPP)/PCA	3283.0	SPP	4.008	5.814	1979.804	0.376	0.001	117.825
3	Austin Energy/PCA	1015.0	ERCOT	1.441	0.006	968.223	0.176	0.001	118.554
4	Brownsville Public Utils Board/PCA	2409.0	ERCOT	0.361	0.001	156.411	0.268	0.001	115.799
5	Duke Power Co/PCA	5416.0	SERC	3.192	5.708	911.853	0.078	0.004	122.073
6	El Paso Electric Co/PCA	5701.0	WSCC	2.626	0.008	1367.956	0.228	0.001	118.653
7	Entergy Electric System/PCA	12506.0	SERC	2.072	3.290	1077.175	0.216	0.016	118.074
8	Lower Colorado River Authority/PCA	11269.0	ERCOT	3.291	4.570	2056.448	0.217	0.001	118.866
9	Reliant Energy HL&P/PCA	8901.0	ERCOT	1.880	2.113	1185.183	0.152	0.001	116.328
10	San Antonio Public Service Bd/PCA	16604.0	ERCOT	3.237	3.830	1887.292	0.227	0.001	118.859
11	South Texas Electric Coop Inc/PCA	17583.0	ERCOT	4.607	14.195	2543.511	0.262	0.001	115.895
12	Southwestern Power Admin/PCA	17716.0	SPP	4.232	3.931	988.510	3.119	0.020	124.461

Figure 7. *EMS-PCA-TX: E-GRID2000 Version 2.0 Power Control Area File (Texas)*

- Y-LOANS: *SECO Approved Loan Amount, By Year (1991-2002)*

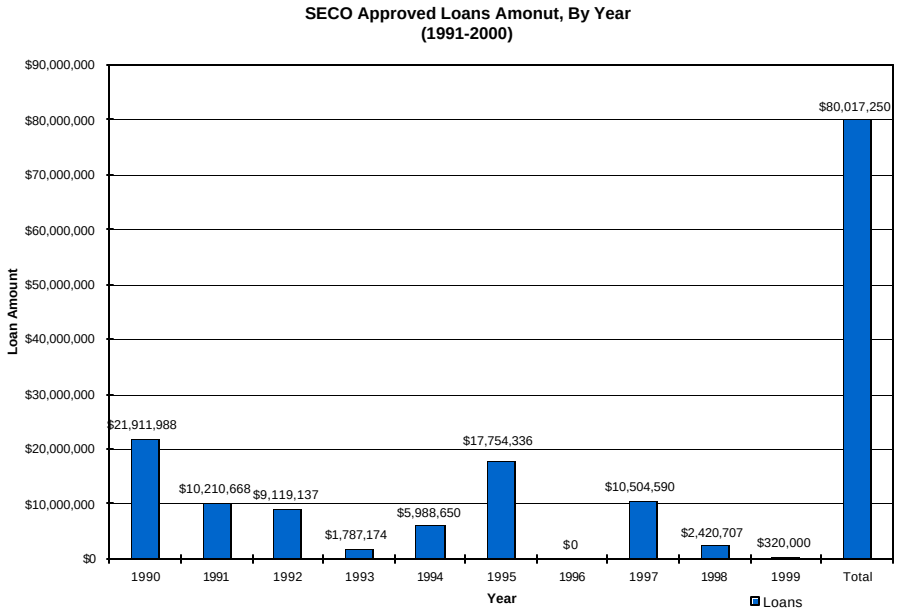

Figure 8. *Y-LOANS: SECO Approved Loan Amount, By Year (1991-2002)*

- S-LOANS: *SECO Approved Loan Amount, By Site (1991-2002)*

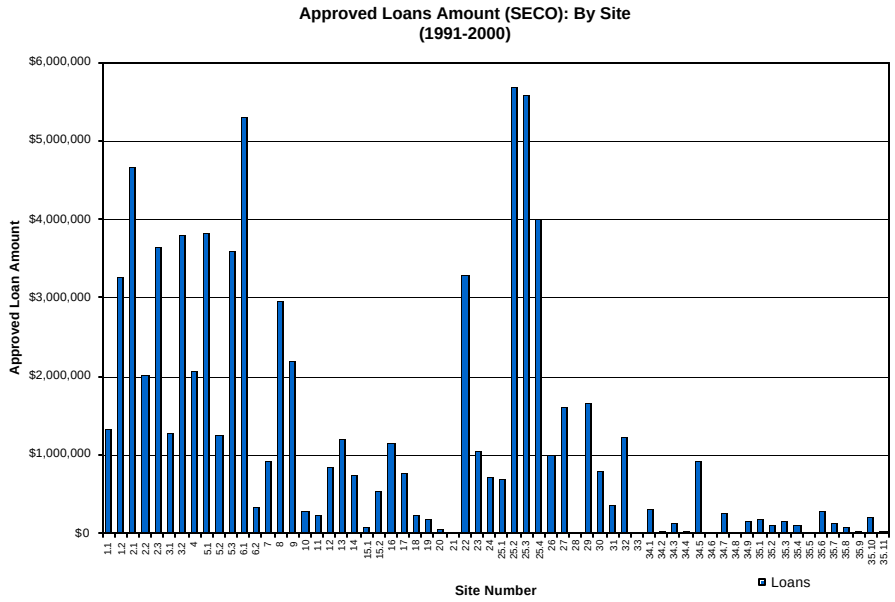

Figure 9. *S-LOANS: SECO Approved Loan Amount, By Site (1991-2002)*

- RET-EST-ACT: *AECR Annual Retrofit, Estimated Saving, and Actual Saving Cost (1991-2002)*

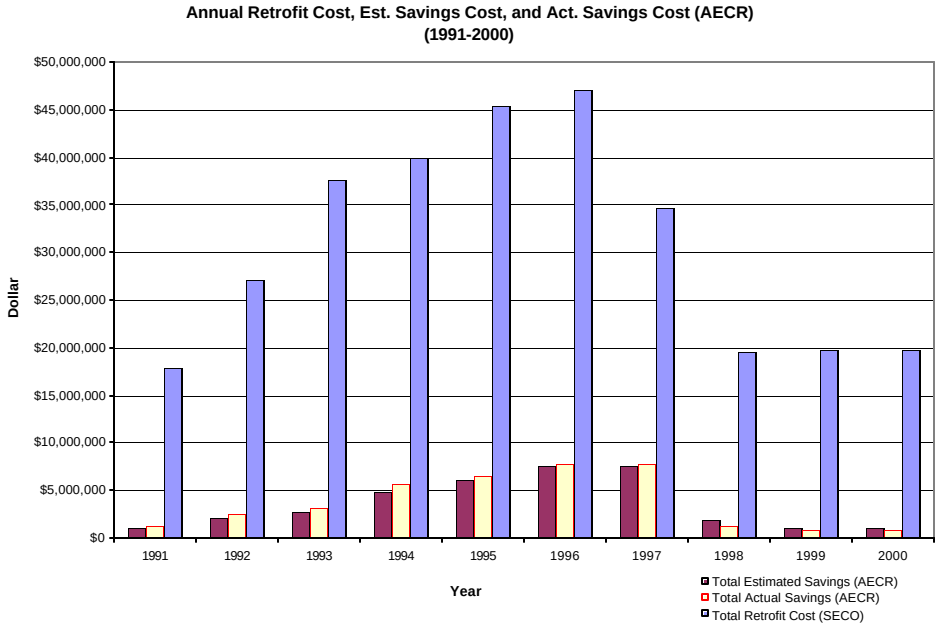

Figure 10. *RET-EST-ACT: AECR Annual Retrofit, Estimated Saving, and Actual Saving Cost (1991-2002)*

- S&B: *AECR Number of Sites & Buildings (1991-2002)*

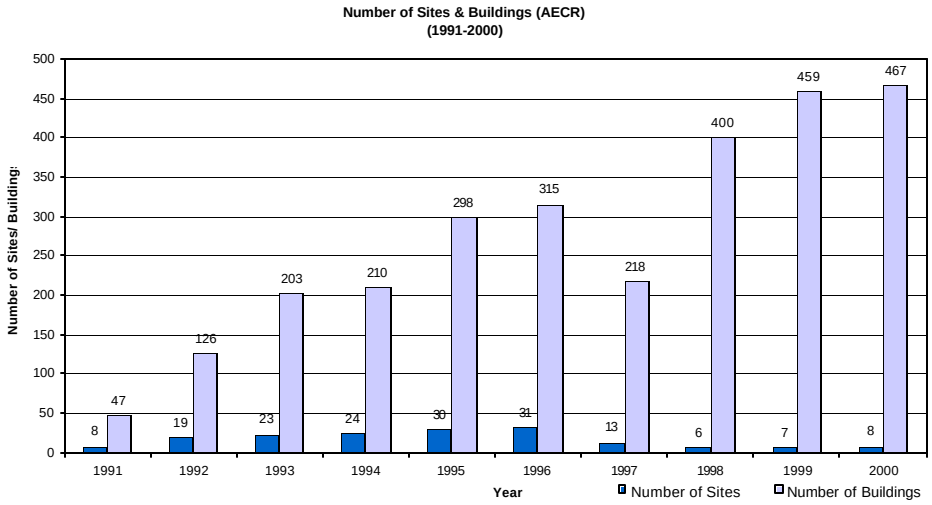

Figure 11. *S&B: AECR Number of Sites & Buildings (1991-2002)*

- MR-PROF: *AECR Multi-year Realization Rate Profiles (1991-2002)*

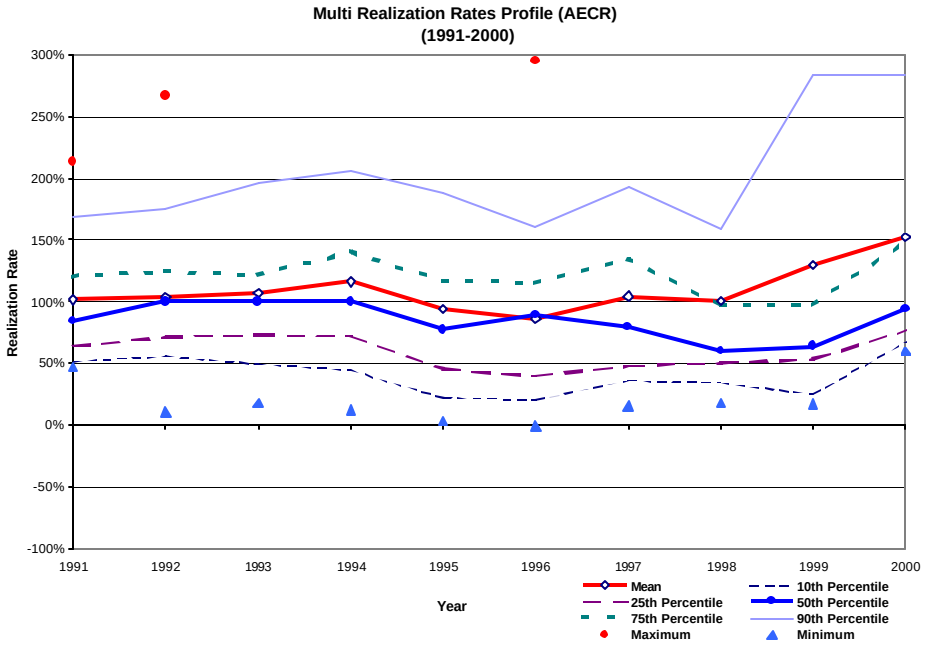

Figure 12. *MR-PROF: AECR Multi-year Realization Rate Profiles (1991-2002)*

- MR-2D: *AECR Multi-year Realization Rate, Two Dimensional Plot (1991-2002)*

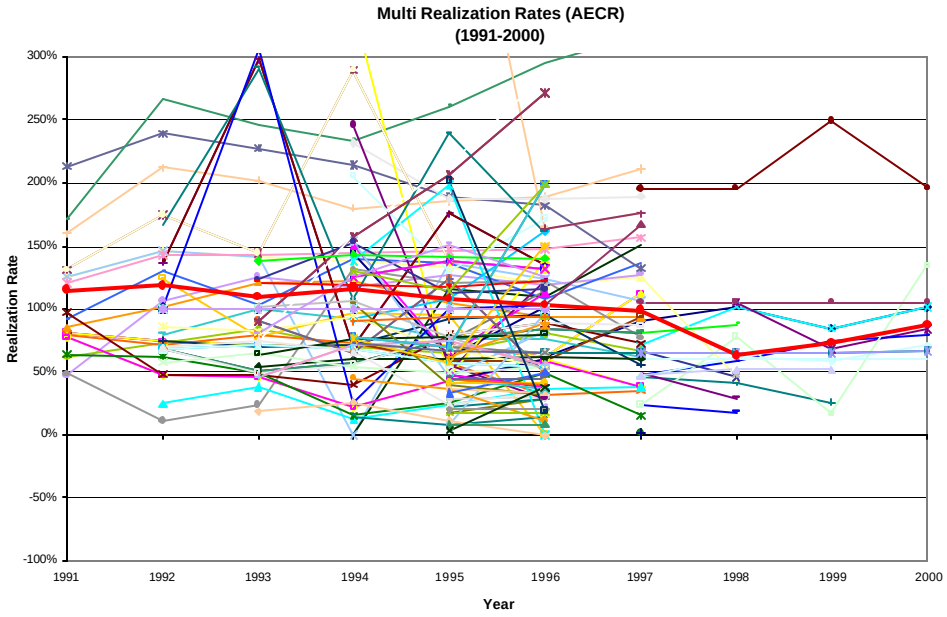

Figure 13. *MR-2D: AECR Multi-year Realization Rate, Two Dimensional Plot (1991-2002)*

- BLS-2D: *AECR Multi-year Realization Rate Buildings List (MR-2D)*

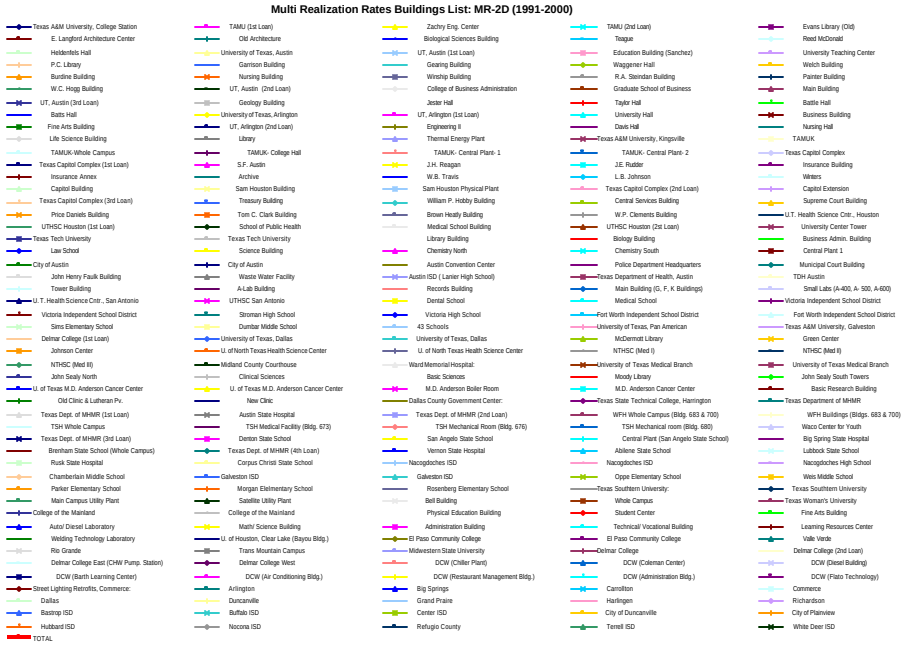

Figure 14. *BLS-2D: AECR Multi-year Realization Rate Buildings List (MR-2D)*

- MR-3D: *AECR Multi-year Realization Rate, Three Dimensional Plot (1991-2002)*

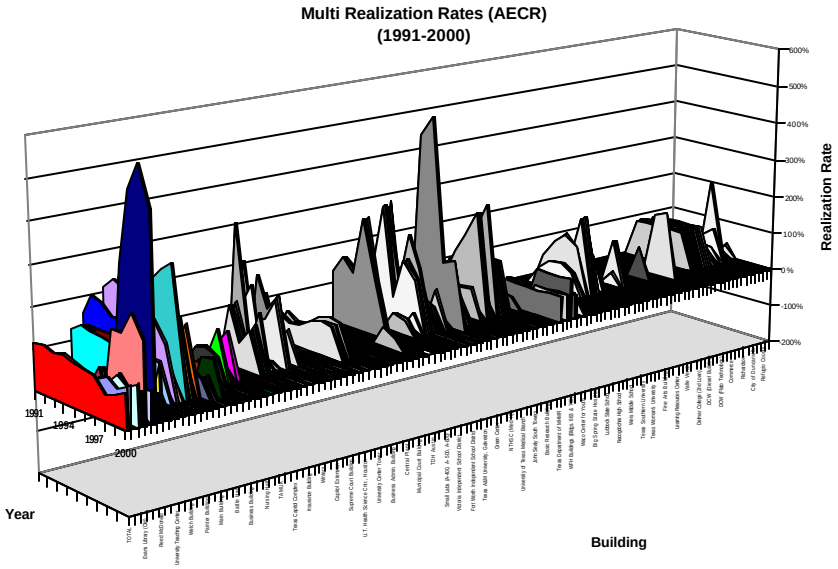

Figure 15. *MR-3D: AECR Multi-year Realization Rate, Three Dimensional Plot (1991-2002)*

- BLS-3D: *AECR Multi-year Realization Rate Buildings List (MR-3D)*

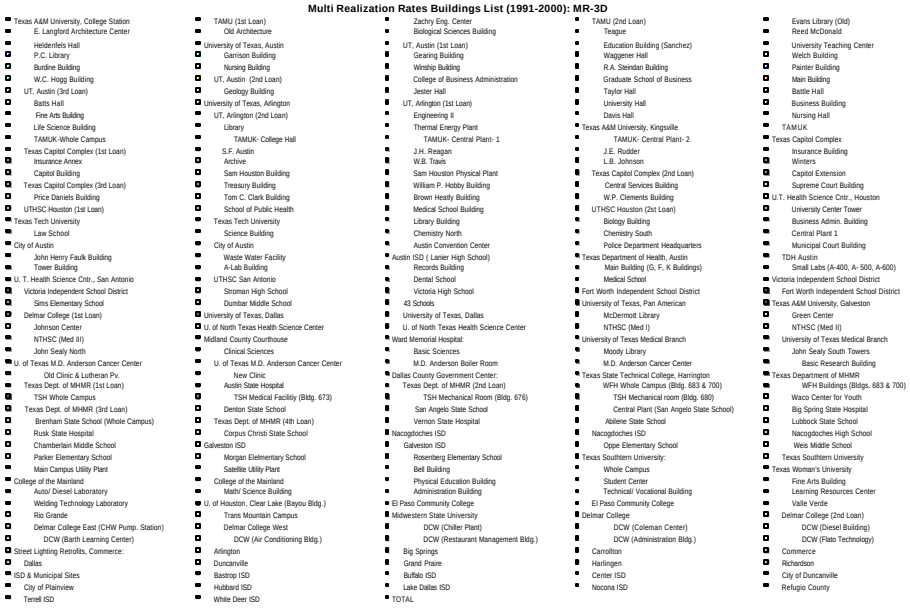

Figure 16. *BLS-3D: AECR Multi-year Realization Rate Buildings List (MR-3D)*

- EST-VS-ACT: *AECR Estimated Savings VS. Actual Savings (1991-2002)*

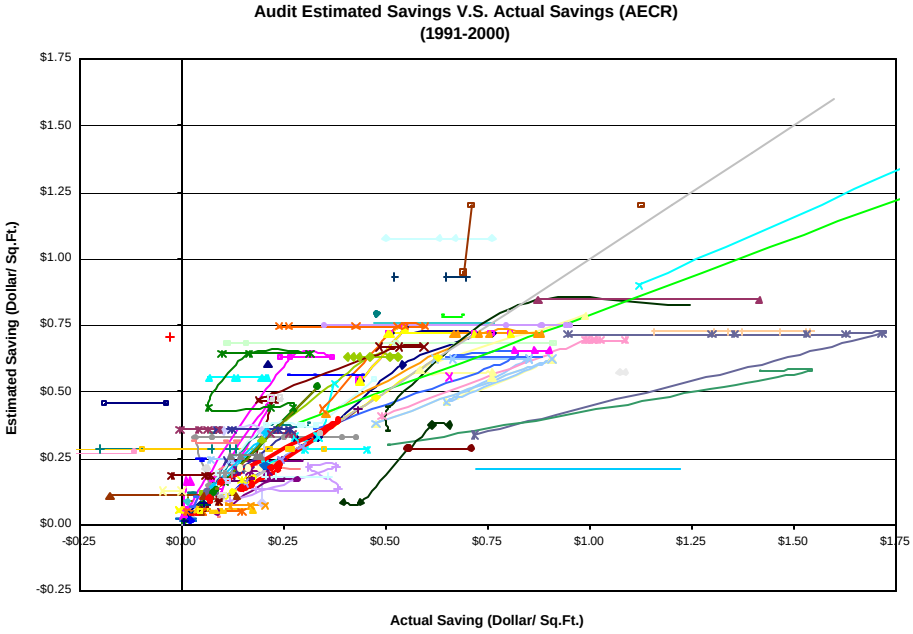

Figure 17. *EST-VS-ACT: AECR Estimated Savings VS. Actual Savings (1991-2002)*

- BLS: *AECR Est. Savings VS. Act. Savings Buildings List (EST-VS-ACT)*

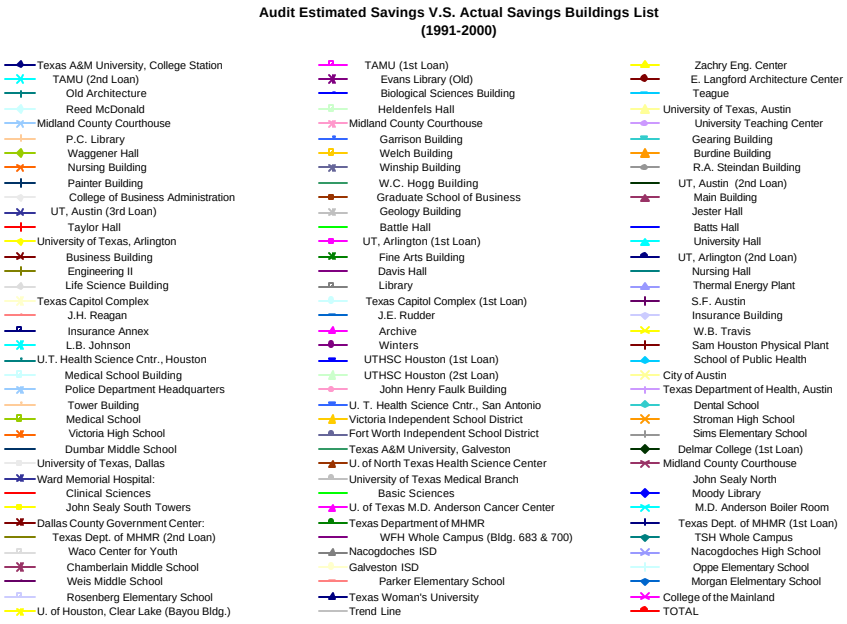

Figure 17. *AECR Est. Savings VS. Act. Savings Buildings List (EST-VS-ACT)*

- R91- R02: *AECR Realization Rate (1991-2002)*

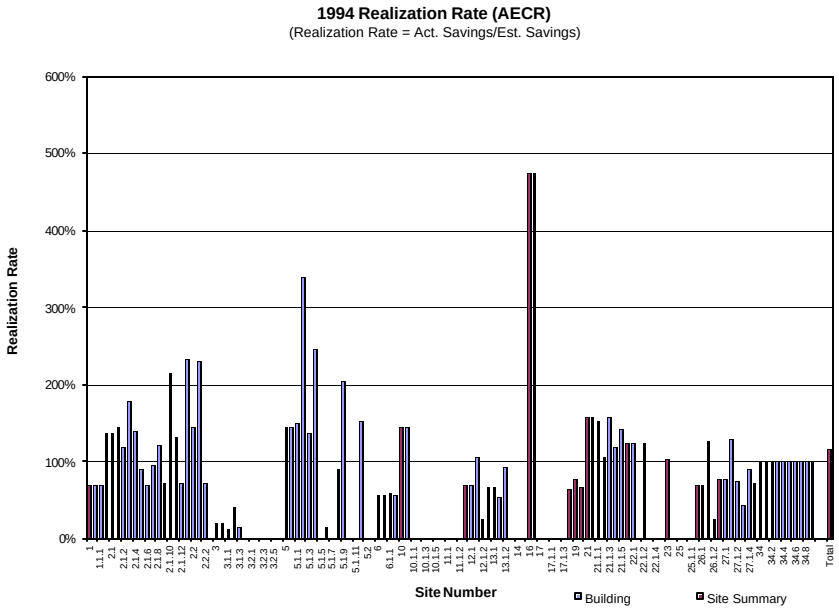

Figure 18. *R91- R02: AECR Realization Rate (1991-2002)*

- P91- P02: *AECR Simple Payback (1991-2002)*

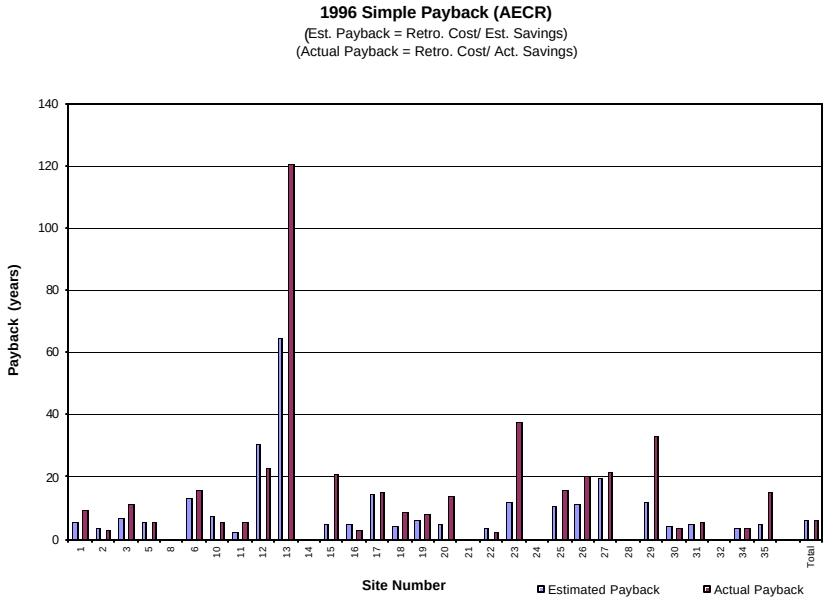

Figure 19. *P91- P02: AECR Simple Payback (1991-2002)*

- EMS00: *LSTAR Emission Reductions (2000)*

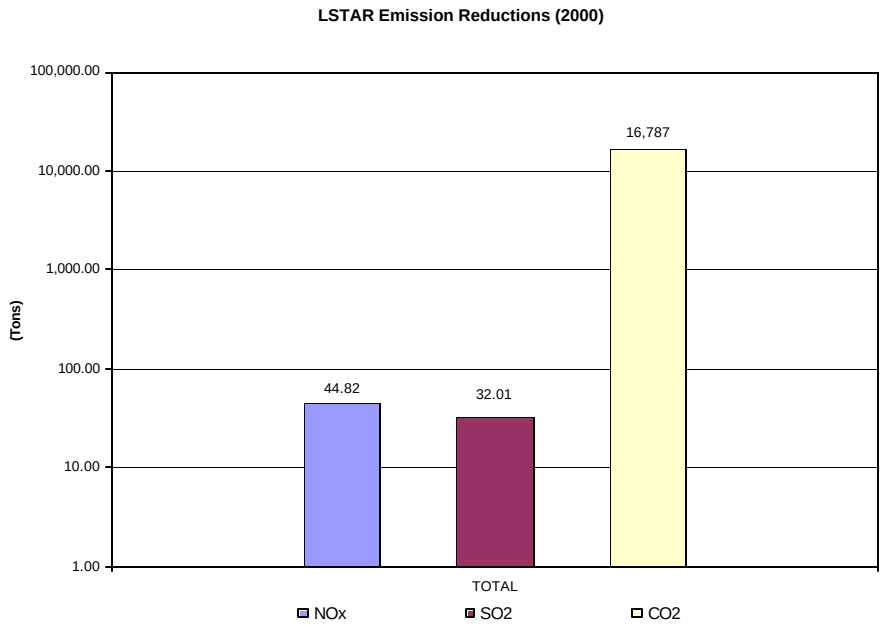

Figure 20. *EMS00: LSTAR Emission Reductions (2000)*

AECR Building Desc

No.	Count No.	Project Name	Description	Building Area (sq. ft.)
1	**CL006,CL080**	**Texas A&M University, College Station**	**Buildings**	
1.1	**CL006**	**TAMU (1st Loan)**	**Building**	**324,400**
1.1.1	CL006	Zachry Eng. Center	Building	324,400
1.2	**CL080**	**TAMU (2nd Loan)**	**Buildings**	**1,329,061**
1.2.1	CL080	Evans Library (Old)	Building	812,289
1.2.2	CL080	E. Langford Architecture Center	Building	102,105
1.2.3	CL080	Old Architecture	Building	69,947
1.2.4	CL080	Biological Sciences Building	Building	96,038
1.2.5	CL080	Teague	Building	63,515
1.2.6	CL080	Reed McDonald	Building	80,218
1.2.7	CL080	Heldenfels Hall	Building	104,949
2	**CL001,CL049,CL081**	**University of Texas, Austin**	**Buildings**	
2.1	**CL001**	**UT, Austin (1st Loan)**	**Buildings**	**2,046,477**
2.1.1	CL001	Education Building (Sanchez)	Building	251,161
2.1.2	CL001	University Teaching Center	Building	152,690
2.1.3	CL001	P.C. Library	Building	483,895
2.1.4	CL001	Garrison Building	Building	54,069
2.1.5	CL001	Gearing Building	Building	61,041
2.1.6	CL001	Waggener Hall	Building	57,598
2.1.7	CL001	Welch Building	Building	439,540
2.1.8	CL001	Burdine Building	Building	103,441
2.1.9	CL001	Nursing Building	Building	99,815
2.1.10	CL001	Winship Building	Building	109,064
2.1.11	CL001	R.A. Steindan Building	Building	56,849
2.1.12	CL001	Painter Building	Building	128,409
2.1.13	CL001	W.C. Hogg Building	Building	48,905
2.2	**CL049**	**UT, Austin (2nd Loan)**	**Buildings**	**718,372**
2.2.1	CL049	College of Business Administration	Building	242,857
2.2.2	CL049	Graduate School of Business	Building	146,763
2.2.3	CL049	Main Building	Building	328,752
2.3	**CL081**	**UT, Austin (3rd Loan)**	**Buildings**	**488,399**
2.3.1	CL081	Geology Building	Building	127,000
2.3.2	CL081	Jester Hall	Building	157,270
2.3.3	CL081	Taylor Hall	Building	100,773
2.3.4	CL081	Battle Hall	Building	47,166
2.3.5	CL081	Batts Hall	Building	56,190
3	**CL002,CL035**	**University of Texas, Arlington**	**Bldgs & Plant**	

3.1	**CL002**	**UT, Arlington (1st Loan)**	**Buildings**	**496,350**
3.1.1	CL002	University Hall	Building	123,450
3.1.2	CL002	Business Building	Building	149,900
3.1.3	CL002	Fine Arts Building	Building	223,000
3.2	**CL035**	**UT, Arlington (2nd Loan)**	Bldgs & Plant	**3,795,935**
3.2.1	CL035	Engineering II	Building	246,102
3.2.2	CL035	Davis Hall	Building	101,580
3.2.3	CL035	Nursing Hall	Building	155,004
3.2.4	CL035	Life Science Building	Building	213,672
3.2.5	CL035	Library	Building	201,040
3.2.6	CL035	Thermal Energy Plant	Plant	2,878,537
4	**CL137**	**Texas A&M University, Kingsville**	**Bldgs & Plants**	
4.1	**CL137**	**TAMUK**	**Bldgs & Plants**	**1,695,000**
4.1.1	CL137	TAMUK-Whole Campus	Buildings	1,695,000
4.1.1.1	CL137	TAMUK- College Hall	Building	50,000
4.1.1.2	CL137	TAMUK- Central Plant- 1	Plant	1,695,000
4.1.1.3	CL137	TAMUK- Central Plant- 2	Plant	1,695,000
5	**CL010,CL046,CL074**	**Texas Capitol Complex**	**Bldgs & Plant**	
5.1	**CL010**	**Texas Capitol Complex (1st Loan)**	**Buildings**	**4,563,229**
5.1.1	CL010	S.F. Austin	Building	470,000
5.1.2	CL010	J.H. Reagan	Building	169,746
5.1.3	CL010	J.E. Rudder	Building	80,000
5.1.4	CL010	Insurance Building	Building	102,000
5.1.5	CL010	Insurance Annex	Building	62,000
5.1.6	CL010	Archive	Building	120,000
5.1.7	CL010	W.B. Travis	Building	491,000
5.1.8	CL010	L.B. Johnson	Building	308,080
5.1.9	CL010	Winters	Building	503,000
5.1.10	CL010	Capitol Building	Building	282,499
5.1.11	CL010	Sam Houston Building	Building	182,961
5.1.12	CL010	Sam Houston Physical Plant	Plant	1,791,943
5.2	**CL046**	**Texas Capitol Complex (2nd Loan)**	**Bldgs & Plant**	**592,781**
5.2.1	CL046	Capitol Extension	Building	592,781
5.3	**CL074**	**Texas Capitol Complex (3rd Loan)**	**Buildings**	**1,917,978**
5.3.1	CL074	Treasury Building	Building	203,672
5.3.2	CL074	William P. Hobby Building	Building	546,749
5.3.3	CL074	Central Services Building	Building	97,030
5.3.4	CL074	Supreme Court Building	Building	72,737
5.3.5	CL074	Price Daniels Building	Building	151,620
5.3.6	CL074	Tom C. Clark Building	Building	121,654
5.3.7	CL074	Brown Heatly Building	Building	262,905
5.3.8	CL074	W.P. Clements Building	Building	461,611

6	**CL005, CL121**	**U.T. Health Science Cntr., Houston**	**Buildings**	
6.1	**CL005**	**UTHSC Houston (1st Loan)**	**Buildings**	**1,120,925**
6.1.1	CL005	School of Public Health	Building	233,738
6.1.2	CL005	Medical School Building	Building	887,187
6.2	**CL121**	**UTHSC Houston (2nd Loan)**	**Buildings**	**315,000**
6.2.1	CL121	University Center Tower	Building	315,000
7	**CL119, CL129**	**Texas Tech University**	**Bldgs & Plants**	
7.1	**CL129**	**Texas Tech University (1st Loan)**	**Bldgs & Plant**	**801,261**
7.1.1	CL129	Biology Building	Building	156,219
7.1.2	CL129	Business Admin. Building	Building	204,495
7.1.3	CL129	Law School	Building	129,043
7.1.4	CL129	Science Building	Building	118,544
7.1.5	CL129	Chemistry North	Building	64,360
7.1.6	CL129	Chemistry South	Building	128,600
7.1.7	N/A	Central Plant 1	Plant	4,300,000
7.2	**CL119**	**Texas Tech University (2nd Loan)**	**Bldg**	**343,235**
7.2.1	CL119	Library Building	Building	343,235
8	**CL084**	**City of Austin**	**Bldgs & Plants**	
8.1	**CL084**	**City of Austin**	**Bldgs & Plant**	**449,274**
8.1.1	CL084	Austin Convention Center	Building	174,456
8.1.2	CL084	Police Department Headquarters	Building	110,000
8.1.3	CL084	Municipal Court Building	Building	44,155
8.1.4	CL084	John Henry Faulk Building	Building	110,663
8.1.5	CL084	Waste Water Facility	Plant	10,000
9	**CL085**	**Austin ISD (Lanier High School)**	**School**	
10	**CL021**	**Texas Department of Health, Austin**	**Buildings**	
10.1	**CL021**	**TDH Austin**	**Buildings**	**293,700**
10.1.1	CL021	Tower Building	Building	108,000
10.1.2	CL021	A-Lab Building	Building	56,000
10.1.3	CL021	Records Building	Building	33,000
10.1.4	CL021	Main Building (G, F, K Buildings)	Building	81,000
10.1.5	CL021	Small Labs (A-400, A- 500, A-600)	Building	15,700
11	**CL054**	**U. T. Health Science Cntr., San Antonio**	**Buildings**	
11.1	**CL054**	**UTHSC San Antonio**	**Buildings**	**1,090,116**
11.1.1	CL054	Dental School	Building	484,019
11.1.2	CL054	Medical School	Building	606,097
12	**CL013**	**Victoria Independent School District**	**Schools**	
12.1	**CL013**	**Victoria Independent School District**	Schools	**467500**
12.1.1	CL013	Stroman High School	Schools	210,500
12.1.2	CL013	Victoria High School	School	257,000
13	**CL014, N/A**	**Fort Worth Independent School District**	**Schools**	
13.1	**CL014**	**Fort Worth Independent School District**	**Schools**	**155,284**

13.1.1	CL014	Sims Elementary School	School	62,400
13.1.2	CL014	Dumbar Middle School	School	92,884
13.2	**N/A**	**43 Schools**	**Schools**	**N/A**
14	**CL044**	**University of Texas, Pan American**	**Buildings**	
15	**CL009,CL029**	**Texas A&M University, Galveston**	**Buildings**	
16	**CL0036,CL096**	**Delmar College**	**Bldg. & Plant**	
16.1	**CL036**	**Delmar College (1st Loan)**	**Bldg. & Plant**	**636,702**
16.2	**CL096**	**Delmar College (2nd Loan)**	**Bldg. & Plant**	**636,702**
16.2.1	CL096	Delmar College East (CHW Pump. Station)	Station	31,496
16.2.2	CL096	Delmar College West	Buildings	214,668
16.2.2.1	CL096	DCW (Chiller Plant)	Plant	214,668
16.2.2.2	CL096	DCW (Coleman Center)	Building	20,585
16.2.2.3	CL096	DCW (Diesel Building)	Building	13,512
16.2.2.4	CL096	DCW (Barth Learning Center)	Building	16,556
16.2.2.5	CL096	DCW (Air Conditioning Bldg.)	Building	12,069
16.2.2.6	CL096	DCW (Restaurant Management Bldg.)	Building	7,532
16.2.2.7	CL096	DCW (Administration Bldg.)	Building	19,023
16.2.2.8	CL096	DCW (Flato Technology)	Building	31,496
17	**CL037**	**University of Texas, Dallas**	**Building**	
17.1	**CL037**	**University of Texas, Dallas**	**Building**	**481,549**
17.1.1	CL037	McDermott Library	Building	211,798
17.1.2	CL037	Green Center	Building	135,796
17.1.3	CL037	Johnson Center	Building	134,055
18	**CL008**	**U. of North Texas Health Science Center**	**Buildings**	
18.1	**CL008**	**U. of North Texas Health Science Center**	**Buildings**	**496,000**
18.1.1	CL008	NTHSC (Med I)	Building	261,000
18.1.2	CL008	NTHSC (Med II)	Building	125,000
18.1.3	CL008	NTHSC (Med III)	Building	110,000
19	**CL031**	**Midland County Courthouse**	**Building**	
20	**CL027**	**Ward Memorial Hospital:**	**Hospital**	
21	**CL075**	**University of Texas Medical Branch**	**Buildings**	
21.1	**CL075**	**University of Texas Medical Branch**	**Buildings**	**757,685**
21.1.1	CL075	John Sealy North	Building	54,494
21.1.2	CL075	Clinical Sciences	Building	124,870
21.1.3	CL075	Basic Sciences	Building	137,856
21.1.4	CL075	Moody Library	Building	67,380
21.1.5	CL075	John Sealy South Towers	Building	373,085
22	**CL019**	**U. of Texas M.D. Anderson Cancer Center**	**Bldgs.&Boiler**	
22.1	**CL019**	**U. of Texas M.D. Anderson Cancer Center**	**Bldgs.&Boiler**	**1,522,193**
22.1.1	CL019	M.D. Anderson Boiler Room	Boiler Room	412,872
22.1.2	CL019	M.D. Anderson Cancer Center	Building	1,109,321
22.1.2.1	CL019	Basic Research Building	Building	120,376

22.1.2.2.	CL019	Old Clinic & Lutheran Pv.	Building	499,013
22.1.2.3	CL019	New Clinic	Building	276,466
23	**CL025**	**Dallas County Government Center:**	**Building**	
24	**CL026**	**Texas State Technical College, Harrington**	**Building**	
25	**CL039, 086, 095, 098**	**Texas Department of MHMR**	**Building**	
25.1	**CL039**	**Texas Dept. of MHMR (1st Loan)**	**Building**	**845,435**
25.1.1	CL039	Austin State Hospital	Building	845,435
25.2	**CL086**	**Texas Dept. of MHMR (2nd Loan)**	**Buildings**	**1,264,617**
25.2.1	CL086	WFH Whole Campus (Bldg. 683 & 700)	Buildings	495,802
25.2.1.1	CL086	WFH Buildings (Bldgs. 683 & 700)	Buildings	81,164
25.2.2	CL086	TSH Whole Campus	Buildings	644,782
25.2.2.1	CL086	TSH Medical Facilitiy (Bldg. 673)	Building	49,651
25.2.2.2	CL086	TSH Mechanical Room (Bldg. 676)	Building	72,140
25.2.2.3	CL086	TSH Mechanical room (Bldg. 680)	Building	88,750
25.2.3	CL086	Waco Center for Youth	Buildings	124,033
25.3	**CL095**	**Texas Dept. of MHMR (3rd Loan)**	**Bldgs & Plant**	**1,642,812**
25.3.1	CL095	Denton State School	Buildings	431,580
25.3.2	CL095	San Angelo State School	Buildings	497,091
25.3.2.1	CL095	Central Plant (San Angelo State School)	Plant	497,091
25.3.3	CL095	Big Spring State Hospital	Building	351,892
25.3.4	CL095	Brenham State School (Whole Campus)	Buildings	362,249
25.3.4.1	CL095	BSS (Bldg.501, Admin)	Buildings	9,681
25.3.4.2	CL095	BSS (Bldg.502, Infirmary)	Building	20,487
25.3.4.3	CL095	BSS (Bldg.503, Austin Unit)	Building	38,981
25.3.4.4	CL095	BSS (Bldg.504, Fannin Unit)	Building	38981
25.3.4.5	CL095	BSS (Bldg.505, Childress Unit)	Building	43,519
25.3.4.6	CL095	BSS (Bldg.506, Driscoll Unit)	Building	38,981
25.3.4.7	CL095	BSS (Bldg.507, Recreation)	Building	30,310
25.3.4.8	CL095	BSS (Bldg.523, Bowie Unit)	Building	408,665
25.4	**CL098**	**Texas Dept. of MHMR (4th Loan)**	**Buildings**	**2,039,977**
25.4.1	CL098	Vernon State Hospital	Buildings	265,049
25.4.2	CL098	Abilene State School	Buildings	612,052
25.4.3	CL098	Lubbock State School	Building	321,357
25.4.4	CL098	Rusk State Hospital	Building	577,601
25.4.5	CL098	Corpus Christi State School	Building	263,918
26	**CL030**	**Nacogdoches ISD**	**Schools**	
26.1	**CL030**	**Nacogdoches ISD**	**Schools**	**335,058**
26.1.1	CL030	Nacogdoches High School	School	202,615
26.1.2	CL030	Chamberlain Middle School	School	132,443
27	**CL033**	**Galveston ISD**	**Schools**	
27.1	**CL033**	**Galveston ISD**	**Schools**	**382,773**
27.1.1	CL033	Oppe Elementary School	School	80,400

27.1.2	CL033	Weis Middle School	School	80,769
27.1.3	CL033	Parker Elementary School	School	81,762
27.1.4	CL033	Morgan Elelmentary School	School	76,798
27.1.5	CL033	Rosenberg Elementary School	School	63,044
28	**CL068**	**Texas Southtern University:**	**Buildings**	
28.1	**CL068**	**Texas Southtern University**	**Bldgs & Plants**	**1,700,000**
28.1.1	CL068	Main Campus Utility Plant	Plant	1,147,500
28.1.2	CL068	Satellite Utility Plant	Plant	212,500
28.1.3	CL068	Bell Building	Building	55,878
28.1.4	CL068	Whole Campus	Buildings	1,700,000
29	**CL047**	**Texas Woman's University**	**Building**	
30	**CL069**	**College of the Mainland**	**Buildings**	
30.1	**CL069**	**College of the Mainland**	**Building**	**339,167**
30.1.1	CL069	Physical Education Building	Building	58,678
30.1.2	CL069	Student Center	Building	23,558
30.1.3	CL069	Fine Arts Building	Building	24,106
30.1.4	CL069	Auto/ Diesel Laboratory	Building	22,230
30.1.5	CL069	Math/ Science Building	Building	18,827
30.1.6	CL069	Administration Building	Building	21,274
30.1.7	CL069	Technical/ Vocational Building	Building	96,216
30.1.8	CL069	Learning Resources Center	Building	56,000
30.1.9	CL069	Welding Technology Laboratory	Building	8,400
31	**CL072**	**U. of Houston, Clear Lake (Bayou Bldg.)**	**Building**	
32	**CL071**	**El Paso Community College**	**Buildings**	
32.1	**CL071**	**El Paso Community College**	**Buildings**	**663,227**
32.1.1	CL071	Valle Verde	Building	406,805
32.1.2	CL071	Rio Grande	Building	102,422
32.1.3	CL071	Trans Mountain Campus	Building	154,000
33	**N/A**	**Midwestern State University**	**Buildings**	
34	**N/A**	**Street Lighting Retrofits, Commerce:**	**Cities**	
34.1	**CL028**	**Arlington**	**City**	**N/A**
34.2	**CL016**	**Big Springs**	**City**	**N/A**
34.3	**CL040**	**Carrollton**	**City**	**N/A**
34.4	**CL017**	**Commerce**	**City**	**N/A**
34.5	**CL023**	**Dallas**	**City**	**N/A**
34.6	**N/A**	**Duncanville**	**City**	**N/A**
34.7	**CL004**	**Grand Praire**	**City**	**N/A**
34.8	**N/A**	**Harlingen**	**City**	**N/A**
34.9	**CL007**	**Richardson**	**City**	**N/A**
35	**N/A**	**ISD & Municipal Sites**	**Buildings**	
35.1	**CL018**	**Bastrop ISD**	**Building**	**N/A**
35.2	**CL022**	**Buffalo ISD**	**Building**	**N/A**

35.3	**CL020**	**Center ISD**	**Building**	**N/A**
35.4	**CL050**	**City of Duncanville**	**Building**	**N/A**
35.5	**CL034**	**City of Plainview**	**Building**	**N/A**
35.6	**CL032**	**Hubbard ISD**	**Building**	**N/A**
35.7	**CL042**	**Lake Dallas ISD**	**Building**	**N/A**
35.8	**CL041**	**Nocona ISD**	**Building**	**N/A**
35.9	**CL038**	**Refugio County**	**Building**	**N/A**
35.10	**CL024**	**Terrell ISD**	**Building**	**N/A**
35.11	**CL015**	**White Deer ISD**	**Building**	**N/A**
36	**CL138**	**North Lake College**	**Buildings**	
37	**N/A**	**Port Arthur ISD**	**Schools**	
37.1	**N/A**	**Port Arthur ISD**	**Schools**	**1,263,559**
37.1.1	N/A	Stephen F. Austin High School	School	129,000
37.1.2	N/A	Franklin Elementary	School	106,000
37.1.3	N/A	Thomas Jefferson High School	School	270,000
37.1.4	N/A	Robert E. Lee Elementary	School	118,000
37.1.5	N/A	Lincoln High School	School	195,355
37.1.6	N/A	Sam Houston Elementary	School	68,000
37.1.7	N/A	Travis Elementary	School	68,000
37.1.8	N/A	Gutierrez Elementary	School	79,532
37.1.9	N/A	Finley Elementary	School	70,828
37.1.10	N/A	Perez Elementary	School	78,379
37.1.11	N/A	Ruiz Elementary	School	80,465
38	**CL107**	**United ISD**	**Bldg. & School**	
38.1	**CL107**	**United ISD**	**Bldg. & School**	**247,500**
38.1.1	CL107	Service Center	Building	38,500
38.1.2	CL107	United High School	School	209,000
38		**TOTAL**		

Note: M&V Classific
* = Basic bill
** = Limited
*** = Sub-m

riptions (1991-2002)

Bldg. Area Summary (sq. ft.)	Number of Building	Number of Bldg. Summary	SECO Retrofit Cost	SECO Metering Cost	% Retrofit Metering Cost	Retrofit Year Completed	Years of Data	M&V Levels
1,653,461		**8**	**$4,598,573**	**$137,957**	**3.0%**	**1997**	**3 to 7**	*******
	1		**$1,331,660**	**$39,950**	**3.0%**	**1991**	**7**	*******
	1					1991	7	***
	7		**$3,266,913**	**$98,007**	**3.0%**	1997	**4 to 5**	*******
	1					1997	4	***
	1					1997	5	***
	1					1997	5	***
	1					1997	5	***
	1					1997	5	***
	1					1997	5	***
	1					1997	5	***
3,253,248		**22**	**$10,352,296**	**$310,570**	**3.0%**	**N/A**	**2 to 7**	*******
	13		**$4,678,852**	**$140,366**	**3.0%**	**1992**	**6 to 7**	*******
	1					1991	6	***
	1					1990	7	***
	1					1990	7	***
	1					1991	7	***
	1					1991	6	***
	1					1991	7	***
	1					1992	7	***
	1					1991	7	***
	1					1991	7	***
	1					1991	7	***
	1					1991	7	***
	1					1991	7	***
	4		**$2,020,887**	**$60,627**	**3.0%**	**N/A**	**5**	*******
	2					N/A	5	***
	1					N/A	5	***
	1					N/A	5	***
	5		**$3,652,557**	**$109,577**	**3.0%**	**1997**	**2 to 3**	*******
	1					1997	3	***
	1					1997	3	***
	1					1997	3	***
	1					1996	3	***
	1					1996	2	***
4,292,285		**9**	**$5,087,968**	**$152,639**	**3.0%**	**1991**	**7**	*******

	3		**$1,281,822**	**$38,455**	**3.0%**	**1991**	**7**	*******
	1					1991	7	***
	1					1991	7	***
	1					1991	7	***
	6		**$3,806,146**	**$114,184**	**3.0%**	**N/A**	**3 to 4**	*******
	1					N/A	4	***
	1					N/A	4	***
	1					N/A	4	***
	1					N/A	4	***
	1					N/A	4	***
	1					N/A	3	***
1,695,000		**33**	**$2,072,144**	**$60,354**	**2.9%**	**2000**	**4**	*******
	33		**$2,072,144**	**$60,354**	**2.9%**	**2000**	**4**	*******
	33					2000	4	***
	1					2000	4	***
	1					2000	4	***
	1					2000	4	***
7,073,988		**21**	**$8,670,925**	**$260,128**	**3.0%**	**N/A**	**4 to 8**	*******
	12		**$3,820,629**	**$114,619**	**3.0%**	**N/A**	**6**	*******
	1					N/A	8	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	8	***
	1					N/A	6	***
	1					N/A	4	***
	1					N/A	4	***
	1					N/A	4	***
	1		**$1,247,420**	**$37,423**	**3.0%**	**N/A**	**4**	*******
	1					N/A	4	***
	8		**$3,602,876**	**$108,086**	**3.0%**	**N/A**	**6**	*******
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***

1,435,925		**3**	**$5,644,349**	**$158,874**	**2.8%**	**N/A**	**2 to 7**	*******
	2		**$5,295,786**	**$158,874**	**3.0%**	**N/A**	**7**	*******
	1					N/A	7	***
	1					1991	7	***
	1		**$348,563**	**$0**	**0.0%**	**1999**	**2**	*******
	1					1999	2	***
1,144,496		**7**	**$1,247,960**	**$26,642**	**2.1%**	**N/A**	**3**	*******
	6		**$927,960**	**$26,642**	**2.9%**	**N/A**	**3**	*******
	1					2000	3	***
	1					2000	3	***
	1					2000	3	***
	1					2000	3	***
	1					2000	3	***
	1					2000	3	***
	1					2000	3	***
	1		**$320,000**	**$0**	**0.0%**	**N/A**	**3**	*******
	1					N/A	3	***
449,274		**5**	**$2,965,054**	**$88,952**	**3.0%**	**N/A**	**3 to 6**	*******
	5		**$2,965,054**	**$88,952**	**3.0%**	**N/A**	**3 to 6**	*******
	1					1997	6	***
	1					N/A	3	***
	1					N/A	3	***
	1					N/A	3	***
	1					N/A	3	***
283,843		**1**	**$2,182,706**	**$65,481**	**3.0%**	**N/A**	**2**	*******
293,700		**9**	**$289,174**	**$8,675**	**3.0%**	**1995**	**6**	*******
	9		**$289,174**	**$8,675**	**3.0%**	**1995**	**6**	*******
	1					N/A	3	***
	1					N/A	3	***
	1					N/A	3	***
	3					N/A	3	***
	3					N/A	3	***
1,090,116		**2**	**$238,484**	**$7,155**	**3.0%**	**N/A**	**6**	*******
	2		**$238,484**	**$7,155**	**3.0%**	**N/A**	**6**	*******
	1					N/A	6	***
	1					N/A	6	***
467,500		**10**	**$834,558**	**$25,037**	**3.0%**	**1992**	**6**	*******
	10		**$834,558**	**$25,037**	**3.0%**	**1992**	**6**	*******
	9					1992	6	***
	1					1992	6	***
155,284		**45**	**$1,200,000**	**$36,000**	**3.0%**	**1991**	**5**	*******
	2		**$1,200,000**	**$36,000**	**3.0%**	**1991**	**5**	*******

	1					1991	5	***
	1					1991	5	***
	43		**N/A**	**N/A**	**N/A**	**N/A**	**4**	***
1,278,290		**25**	**$738,482**	**$22,154**	**3.0%**	**N/A**	**5**	***
382,232		**9**	**$623,895**	**$18,717**	**3.0%**	**1992**	**5**	***
636,702		**23**	**$2,997,323**	**$87,584**	**2.9%**	**1998**	**4 to 6**	***
	23		**$1,157,404**	**$34,722**	**3.0%**	**N/A**	**6**	***
	23		**$1,839,919**	**$52,862**	**2.9%**	**1998**	**4**	***
	1					1998	4	***
	15					1998	4	***
	1					1998	4	***
	1					1998	4	***
	1					1998	4	***
	1					1998	4	***
	1					1998	4	***
	1					1998	4	***
	1					1998	4	***
	1					1998	4	***
481,549		**3**	**$766,201**	**$22,986**	**3.0%**	**N/A**	**3 to 4**	***
	3		**$766,201**	**$22,986**	**3.0%**	**N/A**	**4**	***
	1					N/A	3	***
	1					N/A	3	***
	1					N/A	3	***
496,000		**3**	**$225,052**	**$6,752**	**3.0%**	**1992**	**6**	***
	3		**$225,052**	**$6,752**	**3.0%**	**1992**	**6**	***
	1					1992	6	***
	1					1992	6	***
	1					1992	6	***
90,100		**1**	**$192,902**	**$5,787**	**3.0%**	**1992**	**5**	***
37,000		**1**	**$64,616**	**$1,938**	**3.0%**	**1992**	**5**	***
757,685		**5**	**N/A**	**N/A**	**N/A**	**N/A**	**5**	***
	5		**N/A**	**N/A**	**N/A**	**N/A**	**5**	***
	1					1992	5	***
	1					1992	5	***
	1					N/A	5	***
	1					1992	5	***
	1					N/A	5	***
1,522,193		**13**	**$3,298,767**	**$98,963**	**3.0%**	**N/A**	**3 to 5**	***
	13		**$3,298,767**	**$98,963**	**3.0%**	**N/A**	**3 to 5**	***
	1					N/A	5	***
	12					N/A	3	***
	1					N/A	3	***

	1					N/A	3	***
	1					N/A	5	***
473,800		**1**	**$1,050,080**	**$31,502**	**3.0%**	**N/A**	**6**	*******
245,258		**1**	**$724,564**	**$21,737**	**3.0%**	**N/A**	**3**	*******
5,792,841		**383**	**$15,955,848**	**$434,849**	**2.7%**	**N/A**	**3 to 4**	*******
	1		**$692,102**	**$20,763**	**3.0%**	**N/A**	**4**	*******
	1					N/A	4	***
	84		**$5,687,106**	**$170,613**	**3.0%**	**N/A**	**3 to 5**	*******
	34					N/A	3	***
	2					1996	4	***
	22					N/A	3	***
	1					N/A	4	***
	1					N/A	3	***
	1					N/A	3	***
	28					N/A	4	***
	174		**$5,579,642**	**$141,855**	**2.5%**	**N/A**	**3**	*******
	77					1999	4	***
	67					2000	5	***
	N/A					2000	5	***
	N/A					N/A	4	***
	30					2000	5	***
	1					2000	5	***
	1					2000	5	***
	1					2000	5	***
	1					2000	5	***
	1					2000	5	***
	1					2000	5	***
	1					2000	5	***
	1					2000	5	***
	124		**$3,996,998**	**$101,618**	**2.5%**	**N/A**	**4**	*******
	28					1999	4	***
	96					1999	4	***
	N/A					N/A	4	***
	N/A					N/A	4	***
	N/A					1999	4	***
335,058		**2**	**$990,232**	**$29,707**	**3.0%**	**N/A**	**4**	*******
	2		**$990,232**	**$29,707**	**3.0%**	**N/A**	**4**	*******
	1					N/A	4	***
	1					N/A	4	***
382,773		**5**	**$1,600,000**	**$48,000**	**3.0%**	**N/A**	**6**	*******
	5		**$1,600,000**	**$48,000**	**3.0%**	**N/A**	**6**	*******
	1					N/A	6	***

	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
	1					N/A	6	***
1,700,000		**3**	**N/A**	**N/A**	**N/A**	**N/A**	**2**	****
	3		**N/A**	**N/A**	**N/A**	**N/A**	**2**	****
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	3					N/A	2	***
235,175		**3**	**$1,657,881**	**$49,736**	**3.0%**	**N/A**	**2**	****
339,167		**11**	**$802,204**	**$24,060**	**3.0%**	**N/A**	**2**	****
	11		**$802,204**	**$24,060**	**3.0%**	**N/A**	**2**	****
	1					N/A	1	***
	1					N/A	1	***
	1					N/A	1	***
	1					N/A	1	***
	1					N/A	1	***
	1					N/A	1	***
	1					N/A	1	***
	1					N/A	1	***
	1					N/A	1	***
	1					N/A	1	***
460,576		**1**	**$362,500**	**$10,875**	**3.0%**	**N/A**	**2**	****
663,227		**59**	**$1,221,270**	**$36,638**	**3.0%**	**N/A**	**3**	****
	59		**$1,221,270**	**$36,638**	**3.0%**	**N/A**	**3**	****
	41					N/A	3	***
	2					N/A	3	***
	16					N/A	3	***
697,800		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**1**	****
N/A		**9**	**$1,859,899**	**$55,797**	**3.0%**	**1992**	**4 to 5**	****
	1		**$310,250**	**$9,308**	**3.0%**	**1992**	**5**	****
	1		**$19,044**	**$571**	**3.0%**	**1992**	**5**	****
	1		**$138,096**	**$4,143**	**3.0%**	**1993**	**4**	****
	1		**$29,336**	**$880**	**3.0%**	**1991**	**5**	****
	1		**$927,809**	**$27,834**	**3.0%**	**1993**	**4**	****
	1		**N/A**	**N/A**	**N/A**	**1993**	**4**	****
	1		**$272,136**	**$8,164**	**3.0%**	**1992**	**5**	****
	1		**N/A**	**N/A**	**N/A**	**1992**	**4**	****
	1		**$163,228**	**$4,897**	**3.0%**	**1992**	**5**	****
N/A		**11**	**$1,341,472**	**$40,245**	**3.0%**	**1993**	**2**	****
	1		**$178,000**	**$5,340**	**3.0%**	**1993**	**2**	****
	1		**$114,654**	**$3,440**	**3.0%**	**1993**	**2**	****

	1		**$169,745**	**$5,092**	**3.0%**	**1992**	**2**	*******
	1		**$112,327**	**$3,370**	**3.0%**	**1993**	**2**	*******
	1		**$12,751**	**$383**	**3.0%**	**1992**	**2**	*******
	1		**$283,709**	**$8,511**	**3.0%**	**1992**	**2**	*******
	1		**$129,293**	**$3,879**	**3.0%**	**1993**	**2**	*******
	1		**$77,996**	**$2,340**	**3.0%**	**1993**	**2**	*******
	1		**$16,402**	**$492**	**3.0%**	**1993**	**2**	*******
	1		**$211,438**	**$6,343**	**3.0%**	**1992**	**2**	*******
	1		**$35,157**	**$1,055**	**3.0%**	**1992**	**2**	*******
355,132		**3**	**$1,155,249**	**$39,066**	**3.4%**	**2001**	**2**	*******
1,263,559		**11**	**N/A**	**N/A**	**N/A**	**N/A**	**2**	*******
	11		**N/A**	**N/A**	**N/A**	**N/A**	**2**	*******
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
	1					N/A	2	***
247,500		**2**	**$847,003**	**$0**	**0.0%**	**N/A**	**2**	*******
	2		**$847,003**	**$0**	**0.0%**	**N/A**	**2**	*******
	1					N/A	2	***
	1					N/A	2	***
42,161,737		**763**	**$82,611,671**	**$2,398,915**	**2.9%**			

ation system used in Column 'N' is as follows

ling analysis

l sub-measurement

ıeasurement plus real-time monitoring and diagostics.